Ohio DOT
Next Generation Advanced Traffic Management System (ATMS)
Project Architecture Report

Prepared for:

Ohio Department of Transportation

Prepared by:

Gannett Fleming

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1. Introduction

The Ohio Department of Transportation (ODOT) Next Generation (NextGen) Advanced Traffic Management System (ATMS) project will develop the systems engineering (SE) products required to develop, design and implement a Statewide ATMS. The initial step in this SE process includes the development of an ATMS Project Architecture that will functionally describe the system interfaces the ATMS will include. The current Traffic Management Center (TMC) architecture elements were extracted from the existing statewide architecture and refined to reflect the current state of the TMC and the plans for future capabilities.

This document presents the ODOT Statewide ATMS Project Architecture which is used as an input to the Concept of Operations and the System Requirements for the ATMS Systems Engineering Analysis.

2. Description

The NextGen ODOT Statewide ATMS will replace and consolidate a variety of standalone applications in the 24/7 Traffic Management Center located at the ODOT Headquarters building in Columbus. The replacement of the ATMS software will enable ODOT to manage existing subsystems more efficiently and accommodate emerging and new technologies. The ATMS will be developed in blocks or phases with the first iteration providing the capabilities now available in the Buckeye Traffic system with some enhancements. Blocks 2 and 3 will expand the ATMS beyond the current capabilities including advancements into enhanced decision support and cooperative automated transportation.

The ATMS will support a set of services in coordination with other systems within and bordering Ohio to address traffic management, emergency response, construction and maintenance coordination, traveler information, transportation security, traffic safety, and cooperative automated transportation.

3. Scope

The NextGen Statewide ATMS Project Architecture addresses transportation functionality on a statewide level and identifies interfaces necessary to support the integration and interoperability needs of the ATMS. The ATMS will interface with other statewide systems and eventually with other city and county transportation systems.

The ODOT Statewide ATMS Project Architecture content is described and defined in a series of five report appendices. The architecture was refined using the Systems Engineering Tool for Intelligent Transportation (SET-IT) which uses the Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT) as a reference for functional content. The collection of architecture artifacts contained in the appendices and, in a more complete manner, in the SET-

IT database, convey the systems and interfaces that the ATMS will support in the execution of its mission. The architecture artifacts include:

- Appendix A: ATMS Architecture Mapping – Defines the ATMS functional mappings as defined in the architecture. This forms the basis of the ATMS definition from which the remainder of the architecture interfaces are established.
- Appendix B: ATMS Interconnections/Context Diagram – Defines the systems that interconnect with the ATMS. These systems cooperate to exchange information and carry out services to benefit the users of the transportation system and aid in supporting transportation management activities.
- Appendix C: Stakeholder Inventory – Describes the stakeholders responsible for systems that interface and coordinate with the ATMS. While the systems interface with each other, it is the stakeholders that facilitate and manage the interactions.
- Appendix D: ATMS Services – The services included in the architecture represent the services fundamental to the ATMS mission or are supported by the ATMS capabilities and resources. The services provide important details and scoping for architecture generation and the content of the ATMS concept of operations. Any role the ATMS has in the delivery of a transportation service is identified in the architecture. The service descriptions and diagrams, when considered in their entirety, constitute the breadth and scope of the ATMS functionality. The services are grouped into three blocks representing sets of capabilities to be realized in descending order with the ATMS development over time.
- Appendix E: Standards Profiles – The standards profiles included in Appendix E relate the information flows between a source and destination that includes the ODOT Statewide ATMS and the applicable standards profile.

Appendix A – ATMS Architecture Mapping

Table 1 identifies the physical object mappings for the ATMS in the architecture.

Table 1 - ATMS Architecture Mapping

Element Name	Element Description	Element Status	Element Domain	Associated Physical Objects	Stakeholder
Ohio DOT Statewide ATMS	Ohio DOT Statewide Advanced Traffic Management System (ATMS) is located in Columbus at the Ohio DOT Central Office. The Statewide ATMS operates traffic management and traveler information systems on Ohio's interstates, freeways, expressways, and state highways in each of the State's major metropolitan areas including Akron/Canton, Cincinnati, Cleveland, Columbus, Dayton/Springfield, and Toledo. ATMS operators can control cameras and post traveler information messages to Ohio DOT's DMS, HAR, and to the OHGO website. ATMS operators can also act as liaisons between the Safety Patrol Vehicles and various other public agencies that respond to the scenes of vehicle incidents. For redundancy, it is able to remotely operate district traffic management centers. It also communicates with RWIS Roadside Equipment throughout the state.	Project	Transportation	• Archived Data User System • Center • Emergency Management Center • Maint and Constr Management Center • Traffic Management Center	Ohio Department of Transportation

- Archived Data User System - 'Archived Data User System' represents the systems users employ to access archived data. The general interface provided allows a broad range of users (e.g. planners, researchers, analysts, operators) and their systems (e.g. databases, models, analytical tools, user interface devices) to acquire data and analyses results from the archive.
- Center - This general physical object is used to model core capabilities that are common to any center.
- Emergency Management Center - The 'Emergency Management Center' represents systems that support incident management, disaster response and evacuation, security monitoring, and other security and public safety-oriented ITS applications. It includes the functions associated with fixed and mobile public safety communications centers including public safety call taker and dispatch centers operated by police (including transit police), fire, and emergency medical services. It includes the functions associated with Emergency Operations Centers that are activated at local, regional, state, and federal levels for emergencies and the portable and transportable systems that support Incident Command System operations at an incident. This Center also represents systems associated with towing and recovery, freeway service patrols, HAZMAT response teams, and mayday service providers.

It manages sensor and surveillance equipment used to enhance transportation security of the roadway infrastructure (including bridges, tunnels, interchanges, and other key roadway segments) and the public transportation system (including transit vehicles, public areas such as transit stops and stations, facilities such as transit yards, and transit infrastructure such as rail, bridges, tunnels, or bus guideways). It provides security/surveillance services to improve traveler security in public areas that are not a part of the public transportation system.

It monitors alerts, advisories, and other threat information and prepares for and responds to identified emergencies. It coordinates emergency response involving multiple agencies with peer centers. It stores, coordinates, and utilizes emergency response and evacuation plans to facilitate this coordinated response. Emergency situation information including damage assessments, response status, evacuation information, and resource information is shared. The Emergency Management Center also provides a focal point for coordination of the emergency and evacuation information that is provided to the traveling public, including wide-area alerts when immediate public notification is warranted.

It tracks and manages emergency vehicle fleets using real-time road network status and routing information from the other centers to aid in selecting the emergency vehicle(s) and routes, and works with other relevant centers to tailor traffic control to support emergency vehicle ingress and egress, implementation of special traffic restrictions and closures, evacuation traffic control plans, and other special strategies that adapt the transportation system to better meet the unique demands of an emergency.

- Maintenance and Construction Management Center - The 'Maint and Constr Management Center' monitors and manages roadway infrastructure construction and maintenance activities. Representing both public agencies and private contractors that provide these functions, this physical object manages fleets of maintenance, construction, or special service vehicles (e.g., snow and ice control equipment). The physical object receives a wide range of status information from these vehicles and performs vehicle dispatch, routing, and resource management for the vehicle fleets and associated equipment. The physical object participates in incident response by deploying maintenance and construction resources to an incident scene, in coordination with other center physical objects. The physical object manages equipment at the roadside, including environmental sensors and automated systems that monitor and mitigate adverse road and surface weather conditions. It manages the repair and maintenance of both non-ITS and ITS equipment including the traffic controllers, detectors, dynamic message signs, signals, and other equipment associated with the roadway infrastructure. Weather information is collected and fused with other data sources and used to support advanced decision support systems.

The physical object remotely monitors and manages ITS capabilities in work zones, gathering, storing, and disseminating work zone information to other systems. It manages traffic near the work zone and advises drivers of work zone status (either directly at the roadside or through an interface with the Transportation Information Center or Traffic Management Center physical objects).

Construction and maintenance activities are tracked and coordinated with other systems, improving the quality and accuracy of information available regarding closures and other roadway construction and maintenance activities.

- Traffic Management Center - The 'Traffic Management Center' monitors and controls traffic and the road network. It represents centers that manage a broad range of transportation facilities including freeway systems, rural and suburban highway systems, and urban and suburban traffic control systems. It communicates with ITS Roadway Equipment and Connected Vehicle Roadside Equipment (RSE) to monitor and manage traffic flow and monitor the condition of the roadway, surrounding environmental conditions, and field equipment status. It manages traffic and transportation resources to support allied agencies in responding to, and recovering from, incidents ranging from minor traffic incidents through major disasters.

Appendix B – ATMS Interconnections/Context Diagram

Table 2 lists the systems interfacing with the statewide ATMS along with a description, their status, mapping to architecture physical objects and the stakeholders associated with each element.

Table 2 - ATMS System Interconnections

Name	Description	Status	Physical Object	Stakeholder
Connected Vehicles	Represents vehicles with the advanced technologies that enable vehicle-to-vehicle and vehicle-to-intersection communications under the Connected Vehicles program. Advanced technologies allow for vehicle safety monitoring and warnings to be issued based on vehicle behavior, as well as for automated vehicle control.	Future	• Vehicle OBE	
Connected Vehicles Roadside Equipment	This element represents the roadside equipment that provides vehicle-to-infrastructure communications under the Connected Vehicles program. This is used for data collection from Connected Vehicles-equipped vehicles and to provide information to Connected Vehicles-equipped vehicles.	Future	• Connected Vehicle Roadside Equipment • Field	Ohio Department of Transportation, Smart Columbus
County and City Emergency Operations Centers (EOCs)	Represents County and City Emergency Operations Centers operated throughout the state. EOCs can have a range of emergency operations capabilities, and some can be co-located with local 911 dispatch centers. County EOC's in various sections of the state coordinate response and recovery activities with the Ohio Emergency Management Agency as needed.	Existing	• Center • Emergency Management Center • Other Emergency Management Centers	County and City Emergency Management Agencies
County and City Law Enforcement	Represents central office functions of county and city law enforcement agencies throughout the state, including dispatch of law enforcement vehicles.	Existing	• Center • Emergency Management Center • Enforcement Center	County and City Law Enforcement Agencies
County and City Maintenance and Construction Vehicles	Represents the ITS equipment, e.g., mobile data terminals and AVL systems, on snow plows and other maintenance vehicles that are owned and operated by counties and cities throughout the state of Ohio.	Existing	• Maint and Constr Vehicle OBE • Other MCV OBEs	County and City Public Works Departments

Name	Description	Status	Physical Object	Stakeholder
County and City Maintenance Dispatch Facilities	Represents maintenance dispatch facilities operated by county and city level public works departments. Facilities dispatch county and city maintenance vehicles that perform a wide variety of functions, from traffic signal and roadway maintenance to snow plow operations in winter months.	Existing	• Center • Maint and Constr Management Center • Other Maint and Constr Mgmt Centers	County and City Public Works Departments
County and City Public Safety Dispatch	Represents the public safety functions, including fire, police and sheriff functions, electronic crash reporting, emergency management, and dispatch of emergency vehicles, at the county and city level.	Existing	• Center • Emergency Management Center • Other Emergency Management Centers	County and City Public Safety Agencies
County and City Traffic Data Archives	Represents traffic data archives operated and maintained by county and city public works departments. Data available for general public and for Ohio DOT District Offices primarily includes traffic counts and accident reports.	Future	• Archived Data System • Other Archived Data Systems	County and City Public Works Departments
County and City Traffic Information Websites	Represents various websites that provide real-time and static information for the public, including traffic and roadway information such as road conditions, traffic, construction, and other activity affecting roadways in counties and cities throughout the state.	Existing	• Center • Other Transportation Information Centers • Transportation Information Center	County and City Public Works Departments
County and City Traffic Management Centers	This element represents the individual municipal and county stakeholders that own/operate traffic management/ITS equipment. Many of these stakeholders have a center that receives traffic information and manages the roadway equipment accordingly, as well as coordinates traffic signal control. This element includes the municipal and county public service departments and engineering departments.	Existing	• Archived Data User System • Center • Maint and Constr Management Center • Other Traffic Management Centers • Traffic Management Center	County and City Public Works Departments
Drivers	Represents the private travelers in vehicles.	Existing	• Driver	Drivers

Name	Description	Status	Physical Object	Stakeholder
Freight Rail Operations	Freight rail operations coordinate the operation of freight trains and is connected to other modal systems' operations for efficient movement of commercial goods.	Existing	• Center • Rail Operations Center	Private Rail Operators
Integrated Data Exchange System	The Integrated Data Exchange System is being built as part of the Smart Columbus Initiative. The IDE will provide data distribution services for the ATMS as well.	Planned	• Data Distribution System • Other Data Distribution Systems • Wide Area Information Disseminator System	Ohio Department of Transportation Smart Columbus
Integrated Data Exchange System Center	The IDE System Center provides the "center" functionality of the IDE allowing it to control and manage CV Roadside Units (RSU). This implementation creates a singular interface for CV RSUs and systems requiring data to or from the RSU will connect to the IDE to retrieve the needed information. The IDE System Center is part of the IDE System.	Planned	• Center	Smart Columbus
Media Outlets	Represents the information systems that provide traffic reports, travel conditions, and other transportation-related news services to the traveling public through radio, TV, and other media.	Existing	• Center • Media	Local Media
MPOs Data Archives	Historical archive of traffic and other types of data within MPO areas throughout the state.	Existing	• Archived Data System • Other Archived Data Systems	Metropolitan Planning Organizations
National Weather Service	Service for national, regional, and local weather information.	Existing	• Center • Weather Service System	NOAA

Name	Description	Status	Physical Object	Stakeholder
Neighboring State Traffic Management Centers	Represents Traffic Management Centers operated by neighboring state DOTs that coordinate with the Ohio DOT to operate and maintain traffic and roadways in metro areas that cross state lines. These state DOTs include the states of Kentucky and Indiana that coordinate with the Ohio DOT on traffic in the Cincinnati metro area, the Michigan DOT that coordinates with the Ohio DOT traffic in the Toledo metro area, and the Pennsylvania DOT that coordinates with the Ohio DOT on traffic in the Akron & Canton area.	Existing	• Archived Data User System • Center • Other Traffic Management Centers • Traffic Management Center	Neighboring State DOTs
Ohio DOT 511 Telephone Information Service	Ohio 511 telephone number that provides traveler information on travel times, incidents, and other traveler information made available through the OHGO traveler information website managed by the Ohio Statewide TMC.	Existing	• Center • Other Transportation Information Centers • Transportation Information Center • Traveler Information Voice System	Ohio Department of Transportation
Ohio DOT Automated Gate Closure Systems	Represents automated road closure gates owned and operated by the Ohio DOT used for the remote closure of roads, lanes or ramps. Intended to be for areas where ice or snow or other adverse weather conditions exist on a frequent basis and that cause hazardous conditions for motorists.	Future	• Field • ITS Roadway Equipment • Other ITS Roadway Equipment	Ohio Department of Transportation
Ohio DOT CCTV Cameras	Closed Circuit Television (CCTV) refers to a surveillance system using cameras that transmit visual information over a closed circuit through an electrically conducting cable or wireless transmitter and receiver. It is both used for security purposes and traffic monitoring along Ohio DOT roads throughout the state.	Existing	• Field • ITS Roadway Equipment • Other ITS Roadway Equipment	Ohio Department of Transportation

Name	Description	Status	Physical Object	Stakeholder
Ohio DOT District Offices	There are 12 Ohio DOT District Offices throughout the state that are responsible for traffic operations and maintenance of state roadways. District offices operate and maintain a variety of roadside ITS equipment that is not within the jurisdiction of Ohio DOT Freeway Management Centers. District offices dispatch and monitor maintenance vehicles in their respective districts. Communicates with Ohio DOT RWIS Roadside Equipment within each respective District. More information on ODOT District Offices is at: http://www.dot.state.oh.us/districts/Pages/default.aspx.	Existing	• Archived Data User System • Center • Emergency Management Center • Maint and Constr Management Center • Other Emergency Management Centers • Other Maint and Constr Mgmt Centers • Other Traffic Management Centers • Traffic Management Center	Ohio Department of Transportation
Ohio DOT DMS	Represents fixed and portable Dynamic Message Signs (DMS) locations throughout the state. DMS are electronic traffic signs used on roadways to give travelers information about special events. DMS warn of traffic congestion, accidents, incidents, road work zones, or speed limits on a specific highway segment. Ohio DOT operates and maintains DMS along freeways throughout the state to provide accident, work zone and amber alert information.	Existing	• Field • ITS Roadway Equipment • Other ITS Roadway Equipment	Ohio Department of Transportation

Name	Description	Status	Physical Object	Stakeholder
Ohio DOT HAR	Highway advisory radios (HAR) are licensed low-power AM radio stations set up by the Ohio DOT to provide information regarding traffic conditions, travel times, construction, road incidents, missing persons, and other information deemed relevant to motorists. Roadside signs for HAR and the correct AM frequency include flashing beacon lights that provide for traffic alerts when the beacons are activated. HAR sites are designed to be automated so that when travel times increase by a pre-determined amount for a section of roadway, the HAR will provide travel-time information for that section of roadway only.	Existing	• Field • ITS Roadway Equipment • Other ITS Roadway Equipment	Ohio Department of Transportation
Ohio DOT Infrastructure Monitoring Sensors	Infrastructure monitoring equipment including IR, cameras and motion detectors. These sensors and detectors are operated by the Ohio DOT to monitor and protect infrastructure and facilities, and not for traffic monitoring. Planned to communicate with the Ohio Statewide EOC in Columbus.	Future	• Field • ITS Roadway Equipment • Other ITS Roadway Equipment • Security Monitoring Equipment	Ohio Department of Transportation
Ohio DOT Lane Control Devices	Lane control devices owned and operated by Ohio DOT to manage lanes. These include lane control signals on bridges.	Planned	• Field • ITS Roadway Equipment • Other ITS Roadway Equipment	Ohio Department of Transportation
Ohio DOT Maintenance and Construction Vehicles	Represents the ITS equipment on snow plows and other maintenance vehicles that are owned and operated by the Ohio DOT. Automated Vehicle Locator (AVL) systems are planned for the fleet.	Existing	• Maint and Constr Vehicle OBE • Other MCV OBEs	Ohio Department of Transportation

Name	Description	Status	Physical Object	Stakeholder
Ohio DOT OHGO Traveler Information System	Represents the statewide traveler information website for alerts on traffic incidents, construction, travel times, and other information related to roadways throughout the state. Can be accessed at: http://www.ohgo.com/index. Information provided by this site is updated frequently and comes from a variety of sources, such as pavement sensors, monitoring stations, traffic cameras, and through direct input by Ohio DOT personnel.	Existing	• Center • Data Distribution System • Other Data Distribution Systems • Other Transportation Information Centers • Transportation Information Center	Ohio Department of Transportation
Ohio DOT Ramp Meters	Ramp meters are traffic signals at freeway entrance ramps, which use video detection cameras positioned on the ramp and freeway to determine how quickly drivers can safely enter the freeway. Ramp meters also coordinate timings based on input from Ohio DOT Vehicle Detection Devices that measure traffic speed and volume on the freeway, and traffic demand on the ramp.	Existing	• Field • ITS Roadway Equipment • Other ITS Roadway Equipment	Ohio Department of Transportation
Ohio DOT Rest Area Tourist Information Centers	Represents planned Ohio DOT operated tourist information centers. Centers provide remote traveler support in the form of real-time information related to traffic and weather conditions.	Planned	• Traveler Support Equipment	Ohio Department of Transportation
Ohio DOT Rest Area Truck Parking Availability System	Represents planned parking management systems at rest areas and truck stops to measure parking availability and communicate availability to the public.	Existing	• Field • Parking Management System	Ohio Department of Transportation

Name	Description	Status	Physical Object	Stakeholder
Ohio DOT RWIS Stations	RWIS (Roadway Weather Information System) is operated by the Ohio DOT through 158 weather stations, which provide coverage in all 88 of Ohio's counties. A central service located in Columbus processes the information from each station. Ohio DOT garages use the information collected by the stations to plan their road treatment activities, especially during snow and ice conditions. Ohio DOT also makes road conditions available to the public via a Web server (http://www.ohgo.com/index). The weather stations and sensors are located along interstates, U.S. routes, and state routes. The system comprised 88 wireless weather stations and more than 160 pavement sensors. Two types of weather stations are installed: those located along highways, and those located at county ODOT offices. The stations reported a variety of information, including: Air temperature; Precipitation rate/type; Surface temperature; Sub-surface temperature; Wet/dry surface; Dew point, Relative humidity; Wind direction and speed; Traffic speeds and counts; Visibility. Data communications between the weather station and the central server at Ohio DOT Statewide TMC is conducted via cellular service in 5-minute intervals.	Existing	• Field • ITS Roadway Equipment • Other ITS Roadway Equipment	Ohio Department of Transportation
Ohio DOT Safety Patrol Vehicles	Represents the ITS equipment, e.g., mobile data terminals and AVL systems, on vehicles that provide motorist assistance and congestion mitigation. Ohio DOT provides motorist assistance on ODOT roads throughout the state. Safety Patrol currently patrols interstates in six areas of the state: Cleveland, Cincinnati, Dayton, Akron, Columbus, and Toledo.	Existing	• Basic Emergency Vehicle • Emergency Vehicle OBE	Ohio Department of Transportation
Ohio DOT Speed Monitoring Roadside Equipment	Represents the field equipment that monitors vehicle speeds for enforcement purposes or to advise motorists of their current speeds.	Future	• Field • ITS Roadway Equipment • Other ITS Roadway Equipment	Ohio Department of Transportation

Name	Description	Status	Physical Object	Stakeholder
Ohio DOT Traffic Data Archive System	Represents a statewide archive of traffic data that receives inputs from Vehicle Detection Devices installed by Ohio DOT throughout the state.	Existing	• Archived Data System • Other Archived Data Systems	Ohio Department of Transportation
Ohio DOT Traffic Signal Systems	Represents traffic signal systems throughout the state ranging from fixed-schedule control systems to fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests.	Existing	• Center • Traffic Management Center	Ohio Department of Transportation
Ohio DOT Variable Speed Limit Signs	Variable Speed Limit (VSL) signs are an existing ITS element related to Ohio's Active Traffic and Demand Management (ATDM) program that aims to increase travel time reliability on Ohio DOT roadways in major metro areas. VSL signs in the field would communicate centrally with the Ohio Statewide TMC, and reduced speeds would be implemented either by TMC operators or would be automated based on the level of traffic detected by nearby Ohio DOT Vehicle Detection Devices or nearby Ohio DOT Weather sensors.	Existing	• Field • ITS Roadway Equipment • Other ITS Roadway Equipment	Ohio Department of Transportation
Ohio DOT Vehicle Detection Devices	Represents roadside devices installed for measuring vehicle speed, volume, and occupancy or density. This data can then be used for both the calculation of travel times and incident identification. The conventional form of vehicle detection is side-fired radar detector (SFRD). The main use of SFRD is for ramp metering, where the detectors provide traffic data to both the local ramp meter and central software and allow for dynamic ramp metering along corridors and localized traffic-responsive ramp metering at spot locations. Vehicle detection devices gather traffic counts along Ohio DOT roadways and report data to the Traffic Data Archive System. Most devices exist within major cities, though more are planned for installation throughout the state.	Existing	• Field • ITS Roadway Equipment • Other ITS Roadway Equipment	Ohio Department of Transportation

Name	Description	Status	Physical Object	Stakeholder
Ohio DPS Crash Database	This element refers to a statewide database of crash records that is shared with the Ohio DOT, which reviews the number, frequency and severity of accidents that occur on its system. Can be accessed at: https://ext.dps.state.oh.us/CrashRetrieval/OHCrashRetrieval.aspx.	Existing	• Archived Data System • Other Archived Data Systems	Ohio Department of Public Safety
Ohio Emergency Alert System	Formerly the emergency broadcast system, a regional notification system to the general public. Information may include amber alerts, inclement weather, etc.	Existing	• Alerting and Advisory System • Center	Ohio Emergency Management Agency
Ohio EPA Air Quality Database	The Air Quality System (AQS) is EPA's repository of ambient air quality data. AQS stores data from over 10,000 monitors, 5,000 of which are currently active. State and local agencies collect the data and submit it to AQS on a periodic basis. The AQS database contains measurements of air pollutant concentrations in the 50 United States, plus the District of Columbia, Puerto Rico, and the Virgin Islands. The measurements include both criteria air pollutants and hazardous air pollutants.	Existing	• Archived Data System • Other Archived Data Systems	Ohio Environmental Protection Agency
Ohio EPA Air Quality Management System	Represents the central office system that communicates with air quality monitors installed throughout the state that detect air quality.	Existing	• Center • Emissions Management Center	Ohio Environmental Protection Agency

Name	Description	Status	Physical Object	Stakeholder
Ohio State Highway Patrol Posts	Represents dispatch functions for the Ohio State Highway Patrol throughout the state. OSHP unit for motor carrier enforcement is responsible for enforcement of size and weight laws relating to commercial vehicles. The unit has 10 portable scale teams located throughout the state. A scale team consists of a load limit inspector trooper and two load limit inspectors. There are also 11 fixed scale facilities located throughout the state. All interstate scale facilities are equipped with an electronic clearance system known as "PrePass." Commercial motor vehicles equipped with PrePass will receive an electronic in-cab signal informing the driver whether to pull into the scale or permit the driver to bypass the scale facility. The PrePass signal overrides the posted signs for all trucks including hazardous material placarded vehicles.	Existing	• Center • Commercial Vehicle Administration Center • Emergency Management Center • Enforcement Center • Other Emergency Management Centers	Ohio State Highway Patrol
Ohio State Highway Patrol State Communications Center	The State Communication Centers is a dispatch facility that connects to Ohio DOT and controls emergency operations. It also provides for joint dispatch to incidents.	Existing	• Center • Emergency Management Center • Other Emergency Management Centers	Ohio State Highway Patrol
Ohio Statewide EOC/JDF	The State Emergency Operations Center/Joint Dispatch Facility (EOC / JDF) in Columbus houses the Ohio Emergency Management Agency, Ohio DOT District 6 Headquarters, and the Dispatch Center of the Ohio State Highway Patrol, and communications elements of the Ohio Departments of Natural Resources and Transportation. The facility's purpose is to enhance the state's capabilities to respond to disasters and emergencies, and to improve coordination among state agency partners.	Existing	• Center • Emergency Management Center • Other Emergency Management Centers	Ohio Emergency Management Agency

Name	Description	Status	Physical Object	Stakeholder
Ohio Turnpike Central Dispatch	Represents the central office for dispatch maintenance and incident management including private tow/wreckers and local/municipal fire/EMS. Co-located with Highway Patrol. Dispatch contractors for construction and sometimes maintenance. Located in Berea, Ohio.	Existing	• Archived Data User System • Center • Other Traffic Management Centers • Payment Administration Center • Traffic Management Center	Ohio Turnpike and Infrastructure Commission
OHPASS	Special Hauling Permits administration system that issues oversize/overweight permits for vehicles and loads.	Existing	• Center • Commercial Vehicle Administration Center	Ohio Department of Transportation
Private Fleet and Freight Operations	Private fleet and freight operations that use the roadways operated by ODOT. These include operation with oversize and overweight vehicles and loads requiring permitting from OHPASS.	Existing	• Center • Fleet and Freight Management Center	Private Fleet and Freight Operators
Private Traveler Information Systems	Represents the private traveler information providers serving travelers throughout Ohio. This element could, in the future, provide support to the National Traveler Information 511 number since it collects information from a broad array of operating centers. Could also include a website.	Existing	• Center • Other Transportation Information Centers • Transportation Information Center	Private Companies
Private Weather Service Systems	Systems that provide customized transportation weather forecasts or road weather information.	Existing	• Center • Surface Transportation Weather Service	Private Companies
Regional Event Operations	This element refers to promoters and sponsors of special events, including Ohio State Buckeye football games. They coordinate with traffic and emergency providers.	Existing	• Center • Event Promoter System	Regional Event Operators
Regional Transit Authorities Transit Data Archives	Represents transit data archives operated by regional transit authorities throughout the state.	Existing	• Archived Data System • Other Archived Data Systems	Regional Transit Authorities

Name	Description	Status	Physical Object	Stakeholder
Security and Credentials Management System	The Security Credential Management System (SCMS) is a message security solution for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication. It uses a Public Key Infrastructure (PKI)-based approach that employs highly innovative methods of encryption and certificate management to facilitate trusted communication.	Planned	• Cooperative ITS Credentials Management System	Ohio Department of Transportation
Smart Columbus	Smart Columbus is the smart city initiative for the Columbus Region.	Planned	• Data Distribution System Operator	Smart Columbus
Traveler Information Device	This element refers to personal devices used by the traveling public, including mobile computers, pagers, etc.	Existing	• Personal Information Device	

While difficult to read but demonstrating the complexity of the ODOT NextGen Statewide ATMS, Figure 1 presents the context diagram for the project architecture.

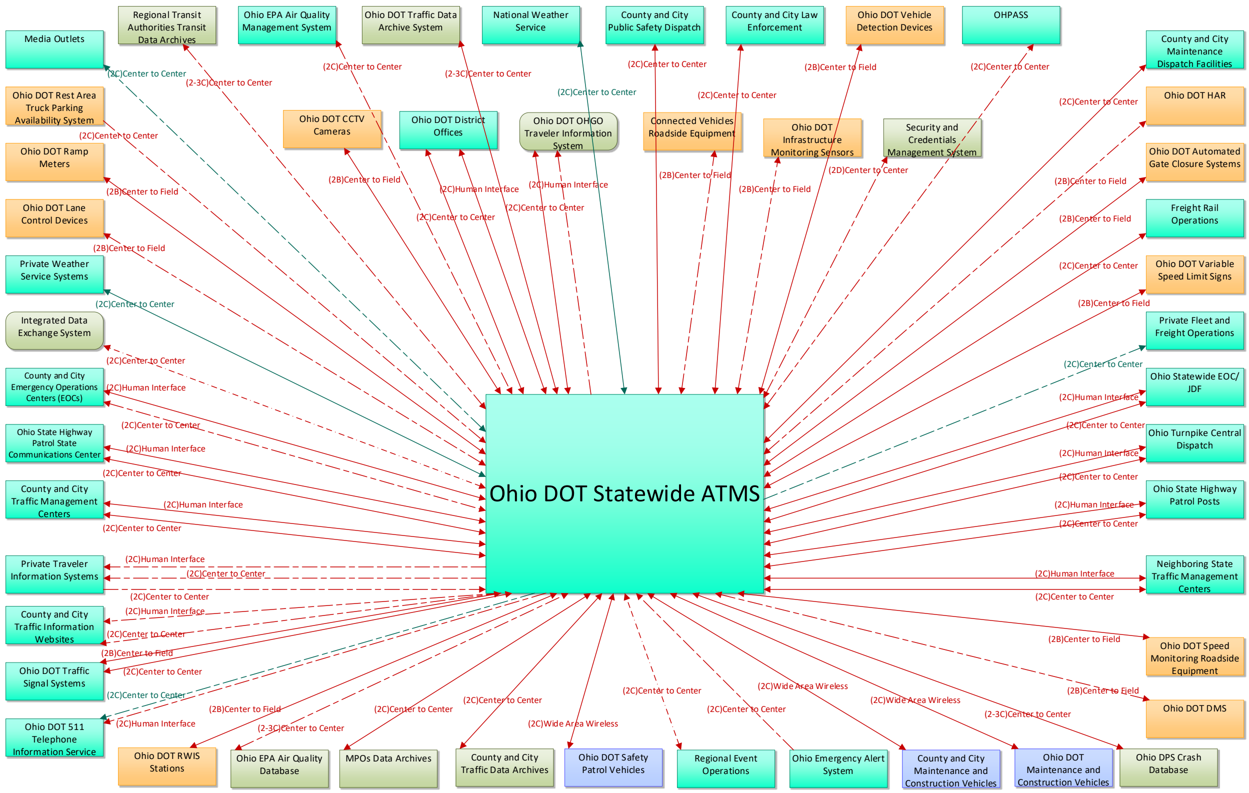


Figure 1 - Ohio ATMS Statewide ATMS Context Diagram

Appendix C – Stakeholder Inventory

Table lists and describes each of the stakeholders involved with systems interfacing with the ATMS. The architecture elements or systems that each stakeholder is associated with are included in the table.

Stakeholder Name	Stakeholder Description	Element
County and City Emergency Management Agencies	Represents county and city emergency management agencies throughout the state that provide emergency response and recovery services, as well as those agencies that coordinate with the Ohio Emergency Management Agency during large scale emergencies and natural disasters.	• County and City Emergency Operations Centers (EOCs)
County and City Law Enforcement Agencies	Represents county and city level law enforcement agencies throughout the state.	• County and City Law Enforcement
County and City Public Safety Agencies	Represents public safety agencies at the county and city level, including fire and rescue departments throughout the state.	• County and City Public Safety Dispatch
County and City Public Works Departments	Represents County and City Public Works Departments, including county and city engineering departments, throughout the state. Cities of Columbus, Cleveland, Cincinnati, Toledo, Akron, Dayton, Canton, and Youngstown. Counties of Franklin, Cuyahoga, Hamilton, Summit, Montgomery, Lucas, Stark, Butler, Lorain, Mahoning, Lake, Warren, Trumbull, Clermont, Medina, Delaware, Licking, Greene, Portage, Fairfield.	• County and City Maintenance and Construction Vehicles • County and City Maintenance Dispatch Facilities • County and City Traffic Information Websites • County and City Traffic Management Centers • County and City Traffic Data Archives
Drivers	Represents the private travelers in vehicles.	• Drivers
Local Media	Represents all local media outlets, including TV, radio, and all other media outlets that provide information to the general public on the transportation system.	• Media Outlets

Stakeholder Name	Stakeholder Description	Element
Metropolitan Planning Organizations	Represents MPOs throughout the state of Ohio, including those that are responsible for maintaining Regional ITS Architectures. MPOs with a Regional ITS Architecture include the Toledo Metropolitan Area Council of Governments (TMACOG), Eastgate Regional Council of Governments, Akron Metropolitan Area Transportation Study and Stark County Area Transportation Study (AMATS-SCATS), Mid-Ohio Regional Planning Commission (MORPC), Miami Valley Regional Planning Commission (MVRPC), Ohio-Kentucky-Indiana (OKI) Regional Council of Governments, and the Northeast Ohio Areawide Coordinating Agency (NOACA). MPO's without a Regional ITS Architecture include the Lima-Allen County Regional Planning Commission (Ohio DOT District 1), Erie County Regional Planning Commission (Ohio DOT District 3), Richland County Regional Planning Commission (Ohio DOT District 3), Licking County Area Transportation Study (Ohio DOT District 5), Clark County-Springfield Transportation Coordinating Committee (Ohio DOT District 7), KYOVA MPO (Ohio DOT District 9), Wood-Washington-Wirt Interstate Planning Commission (WWW) (Ohio DOT District 10), Brooke-Hancock-Jefferson Metropolitan Planning Commission (Ohio DOT District 11), and the Belomar Regional Council (Ohio DOT District 11). These MPOs coordinate with Regional Transportation Planning Organizations (RTPOs) that represent large rural areas of the state on various transportation projects as needed.	• MPOs Data Archives
Neighboring State DOTs	Other State Departments of Transportation with which the Ohio DOT works to monitor traffic operations across state lines. These include the Pennsylvania DOT, the Kentucky Transportation Cabinet, the Indiana DOT, and the Michigan DOT.	• Neighboring State Traffic Management Centers
NOAA	National Oceanic and Atmospheric Administration, which includes the National Weather Service.	• National Weather Service
Ohio Bureau of Motor Vehicles	Ohio Bureau of Motor Vehicles	•
Ohio Department of Public Safety	The Ohio Department of Public Safety serves and protects the safety and security of Ohioans through six divisions: Bureau of Motor Vehicles, Emergency Management Agency, Emergency Medical Services, Homeland Security, Highway Patrol, and Office of Criminal Justice Services. One of their tasks includes obtaining all crash data for the State of Ohio.	• Ohio DPS Crash Database

Stakeholder Name	Stakeholder Description	Element
Ohio Department of Transportation	Ohio Department of Transportation is responsible for developing and maintaining all state and federal roadways in the state of Ohio with exception of the Ohio Turnpike. In addition to highways, the department also helps develop public transportation and public aviation programs. The Ohio DOT is headquartered in Columbus and has divided the state into 12 districts in order to facilitate regional development. Each district is responsible for the planning, design, construction, and maintenance of the state and federal highways in their district.	• Connected Vehicles Roadside Equipment • Integrated Data Exchange System • 511 Telephone Information Service • Automated Gate Closure Systems • CCTV Cameras • District Offices • DMS • HAR • Infrastructure Monitoring Sensors • Lane Control Devices • Maintenance and Construction Vehicles • OHGO Traveler Information System • Ramp Meters • Rest Area Tourist Information Centers • RWIS Stations • Safety Patrol Vehicles • Speed Monitoring Roadside Equipment • Statewide ATMS • ODOT Traffic Data Archive System • ODOT Traffic Signal Systems • Variable Speed Limit Signs • Vehicle Detection Devices • OHPASS • Security and Credentials Management System • Rest Area Truck Parking Availability System

Stakeholder Name	Stakeholder Description	Element
Ohio Emergency Management Agency	A division of the Ohio Department of Public Safety, the Ohio Emergency Management Agency coordinates activities to mitigate, prepare for, respond to and recover from disasters, both natural and man-made. The agency interfaces with local, state and federal agencies in an effort to bring resources of recovery and support to Ohioans impacted by the disaster. Ohio EMA agency activities, in addition to disaster response and recovery include: education, training, planning, preparedness, strengthening Ohio's first responder capabilities and improving communication across the state. Ohio EMA's current staffing roster includes nine field liaison positions, each responsible for liaison with and assistance to approximately nine county emergency management agencies. The state is separated geographically into the following sections: northwest, west north central, west central, southwest, central, northeast, north central, east central, southeast and south central.	• Ohio Emergency Alert System • Ohio Statewide EOC/JDF
Ohio Environmental Protection Agency	The Ohio Environmental Protection Agency is a state agency whose goal is to protect the environment and public health by ensuring compliance with environmental laws. Ohio EPA establishes and enforces standards for air, water, waste management and cleanup of sites contaminated with hazardous substances. They also provide financial assistance to businesses and communities; environmental education programs for businesses and the public; and pollution prevention assistance to help businesses minimize their waste at the source.	• Ohio EPA Air Quality Database • Ohio EPA Air Quality Management System
Ohio State Highway Patrol	The Ohio State Highway Patrol is an internationally accredited agency whose mission is to protect life and property, promote traffic safety and provide professional public safety services with respect, compassion, and unbiased professionalism. The Patrol offers statewide emergency response services, investigates criminal activities on state-owned property, and provides security for the Governor and other dignitaries. The Ohio State Highway Patrol is comprised of 8 offices: Field Operations, Finance and Logistic Services, Licensing and Commercial Standards, Technology and Communication Services, Recruitment and Training, Strategic Services, Investigative Services, and Human Resource Management.	• Ohio State Highway Patrol Posts • Ohio State Highway Patrol State Communications Center

Stakeholder Name	Stakeholder Description	Element
Ohio Turnpike and Infrastructure Commission	Represents the agency responsible for operation and maintenance of the 241-mile Ohio Toll Road. Agency is a separate organization from the Ohio DOT.	• Ohio Turnpike Central Dispatch
Private Companies	Represents private companies that provide various transportation information and services to the Ohio DOT and the general public traveling along state roadways. Including towing and recovery service providers throughout the state, including those involved in the Towing and Recovery Incentive Program (TRIP) developed by the Ohio DOT.	• Private Traveler Information Systems • Private Weather Service Systems
Private Fleet and Freight Operators	Private owners of commercial vehicles that carry goods throughout the region.	• Private Fleet and Freight Operations
Private Rail Operators	Represents private railroad companies that operate and maintain railroad systems in the state of Ohio.	• Freight Rail Operations
Regional Event Operators	Represents event operators in Ohio that provide event information to the Ohio DOT and transportation and public safety agencies throughout the state to manage travel around major events.	• Regional Event Operations
Regional Transit Authorities	Represents Regional Transit Authorities that operate and maintain large public transportation systems throughout the state and coordinate transit operations with the Ohio DOT and County and City Traffic Management Centers as needed. Regional Transit Authorities include the following: Central Ohio Transit Authority (COTA) operating in the Columbus area, the Greater Cleveland Regional Transit Authority (RTA), the Greater Dayton Regional Transit Authority (GDRTA), the Southwest Ohio Regional Transit Authority (SORTA), the Toledo Area Regional Transit Authority (TARTA), Akron METRO Regional Transit Authority, Portage Area Regional Transportation Authority (PARTA), Stark Area Regional Transportation Authority (SARTA), and the Western Reserve Transit Authority (WRTA).	• Regional Transit Authorities Transit Data Archives
Smart Columbus	Smart Columbus is the smart city initiative for the Columbus Region.	• Smart Columbus

Appendix D – ATMS Services

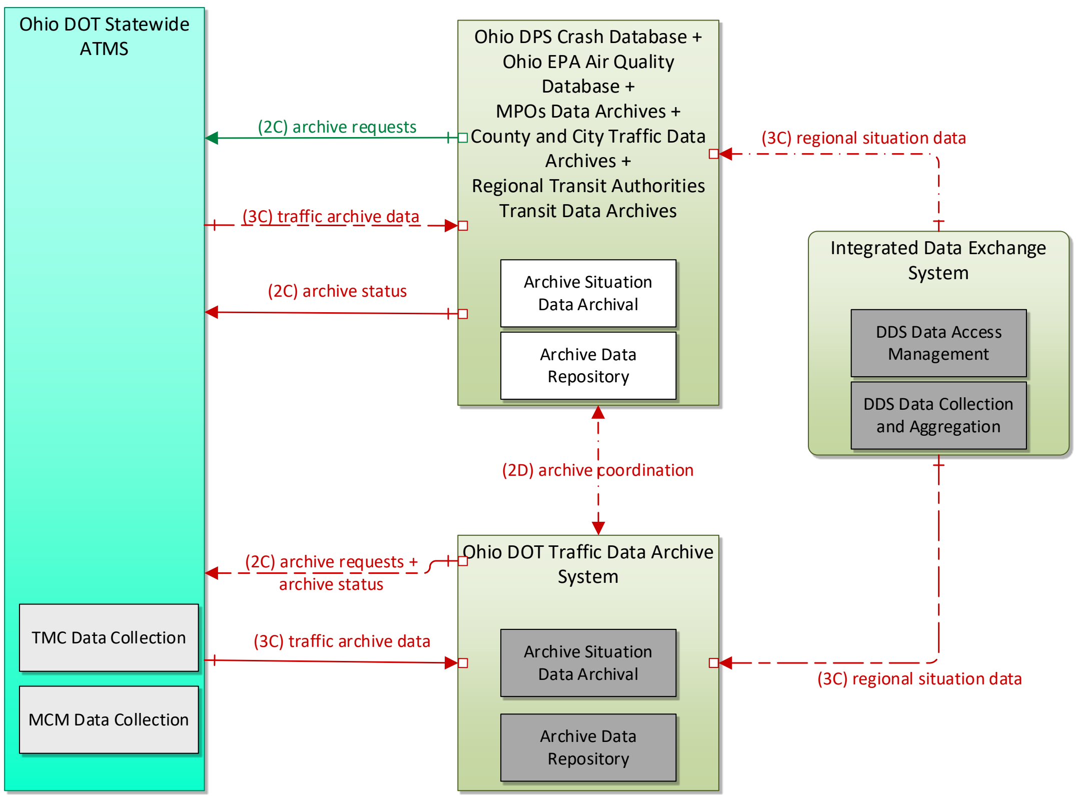
This appendix presents the Layer 2 diagrams for each service package the ATMS supports in some manner. The services are categorized in three blocks.

- Block 1 Service Packages represent services that address the existing TMC capabilities.
  - DM01: ITS Data Warehouse
  - MC04: Winter Maintenance
  - MC05: Roadway Maintenance and Construction
  - MC08: Maintenance and Construction Activity Coordination
  - PM01: Parking Space Management – ITS
  - PS08: Roadway Service Patrols
  - PS10: Wide-Area Alert
  - TI01: Broadcast Traveler Information – ITS
  - TI02: Personalized Traveler Information
  - TM01: Infrastructure-Based Traffic Surveillance
  - TM02: Vehicle-Based Traffic Surveillance
  - TM05: Traffic Metering
  - TM06: Traffic Information Dissemination
  - TM07: Regional Traffic Management
  - TM08: Traffic Incident Management System
  - TM09: Integrated Decision Support and Demand Management
  - TM19: Roadway Closure Management
  - TM20: Variable Speed Limits
  - TM22: Dynamic Lane Management and Shoulder Use – ITS
  - VS08: Queue Warning – ITS
  - WX01: Weather Data Collection
  - WX02: Weather Information Processing and Distribution
  - WX03: Spot Weather Impact Warning – ITS
- Block 2 Services Packages are services that expand the capabilities of the ATMS as a next step.
  - DM02: Performance Monitoring
  - MC06: Work Zone Management – ITS
  - PS02: Routing Support for Emergency Responders
  - PS11: Early Warning System
  - PS12: Disaster Response and Recovery
  - PS13: Evacuation and Reentry Management
  - SU03: Data Distribution – ITS
  - SU08: Security and Credentials Management – ITS
  - TM03: Traffic Signal Control
  - CVOOps: Carrier Permitting

- Block 3 Services Packages apply advanced technology solutions such as cooperative automated vehicle interfaces and are considered future capabilities that will required technology maturation.
    - MC06CV: Work Zone Management – CV
    - MC09: Infrastructure Monitoring
    - PM01CV: Parking Space Management - CV
    - PS09: Transportation Infrastructure Protection
    - SU03CV: Data Distribution – CV
    - SU08CV: Security and Credentials Management – CV
    - TI01CV: Broadcast Traveler Information – CV
    - TI07: In-Vehicle Signage
    - TM02CV: Vehicle-Based Traffic Surveillance – CV
    - TM21: Speed Harmonization
    - TM22CV: Dynamic Lane Management and Shoulder Use – CV
    - VS08CV: Queue Warning – CV
    - VS13: Intersection Safety Warning and Collision Avoidance
    - VS16: Automated Vehicle Operations
    - WX03CV: Spot Weather Impact Warning – CV

Block 1 Service Packages

DM01: ITS Data Warehouse (Block 1) - This service package provides access to transportation data to support transportation planning, condition and performance monitoring, safety analysis, and research. Configurations range from focused repositories that house data collected and owned by a single agency, district, private sector provider, or research institution to broad repositories that contain multimodal, multidimensional data from varied data sources covering a broader region. Both central repositories and physical distributed ITS data repositories are supported. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse service package may be parsed by the local repository and dynamically translated to requests to other repositories that relay the data necessary to satisfy the request.



2: DM01: ITS Data Warehouse (1)			
2	Based on ARC-IT Physical Diagram r4	Nov 04 2018	des

Figure 2 - DM01: ITS Data Warehouse (1)

MC04: Winter Maintenance (Block 1) - This service package supports winter road maintenance including snow plow operations, roadway treatments (e.g., salt spraying and other anti-icing material applications), and other snow and ice control activities. This package monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities, determine the appropriate snow and ice control response, and track and manage response operations.

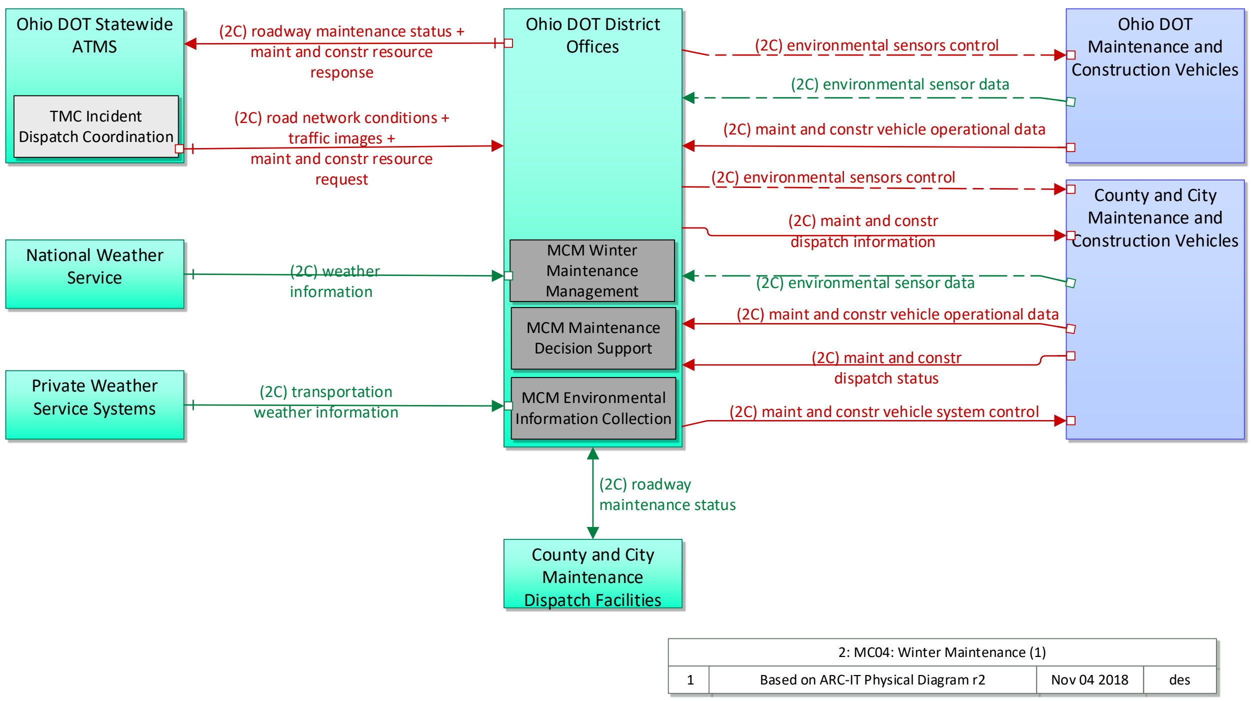


Figure 3 - MC04: Winter Maintenance (1)

MC05: Roadway Maintenance and Construction (Block 1) - This service package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Maintenance services include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, CCTV, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling maintenance and construction activities.

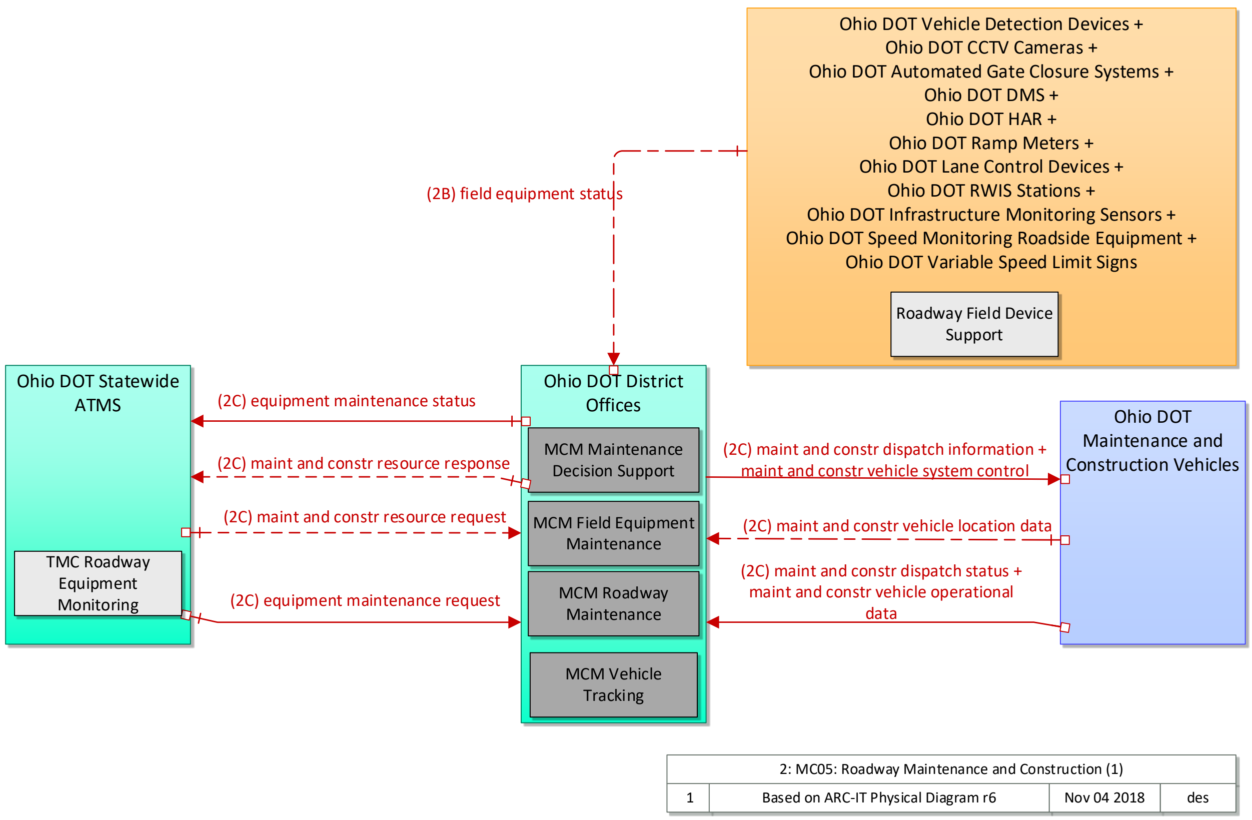
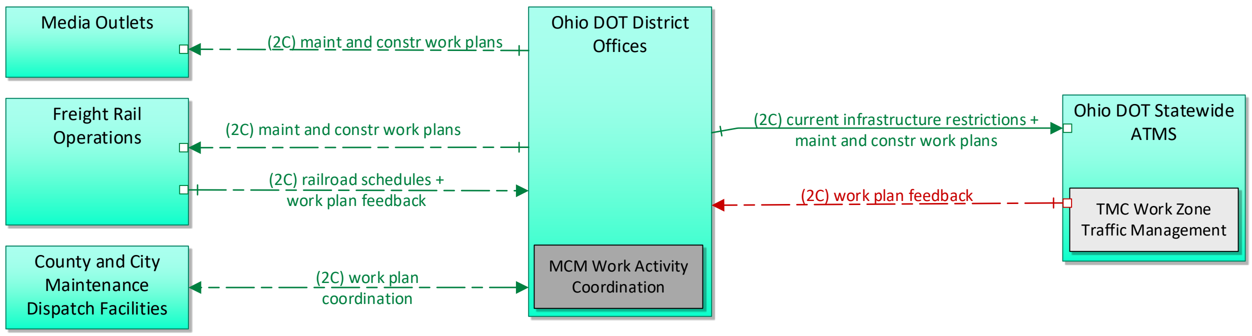


Figure 4 - MC05: Roadway Maintenance and Construction (1)

MC08: Maintenance and Construction Activity Coordination (Block 1) - This service package supports the dissemination of maintenance and construction activity to centers that can utilize it as part of their operations, or to Transportation Information Centers who can provide the information to travelers. Center to center coordination of work plans supports adjustments to reduce disruption to regional transportation operations.



2: MC08: Maintenance and Construction Activity Coordination (1)			
1	Based on ARC-IT Physical Diagram r1	Nov 04 2018	des

Figure 5 - MC08: Maintenance and Construction Activity Coordination (1)

PM01: Parking Space Management – ITS (Block 1) - This service package monitors and manages parking spaces in lots, garages, and other parking areas and facilities. It assists in the management of parking operations by monitoring parking lot ingress and egress, parking space occupancy and availability. Infrastructure-based detectors may be used to monitor parking occupancy. The service package shares collected parking information with local drivers and information providers for broader distribution.

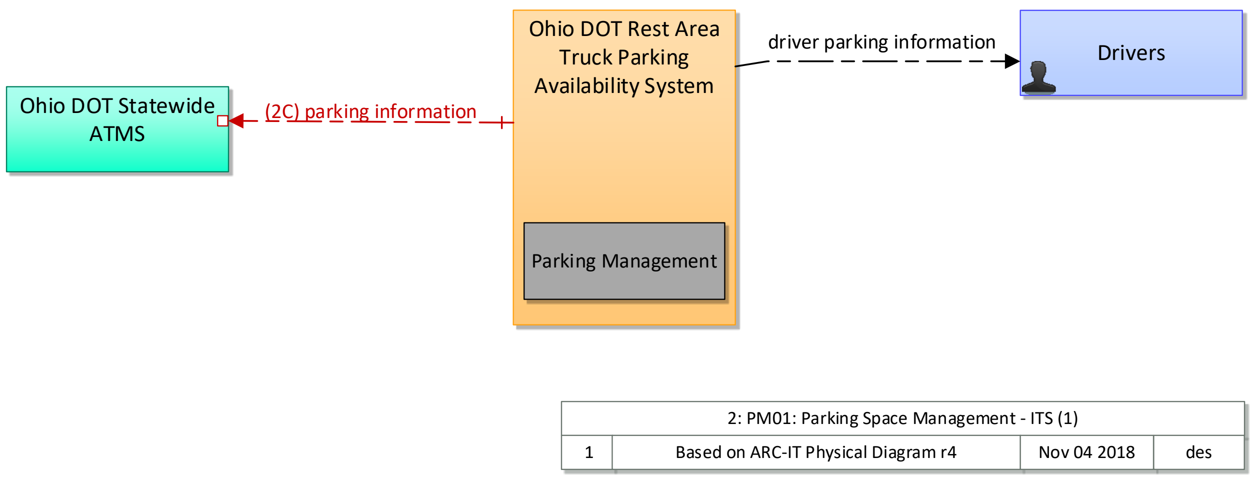
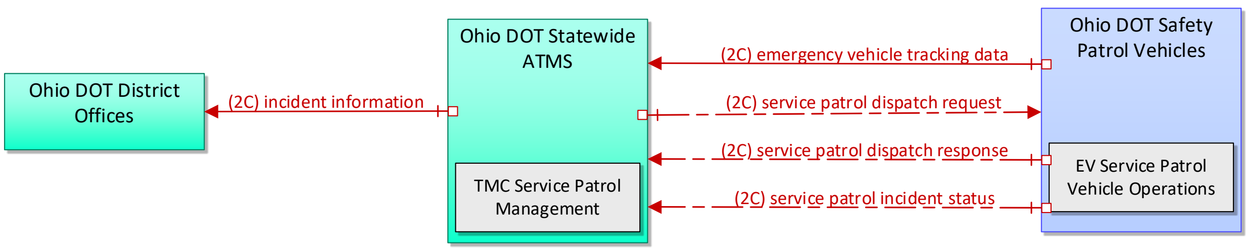


Figure 6 - PM01: Parking Space Management - ITS (1)

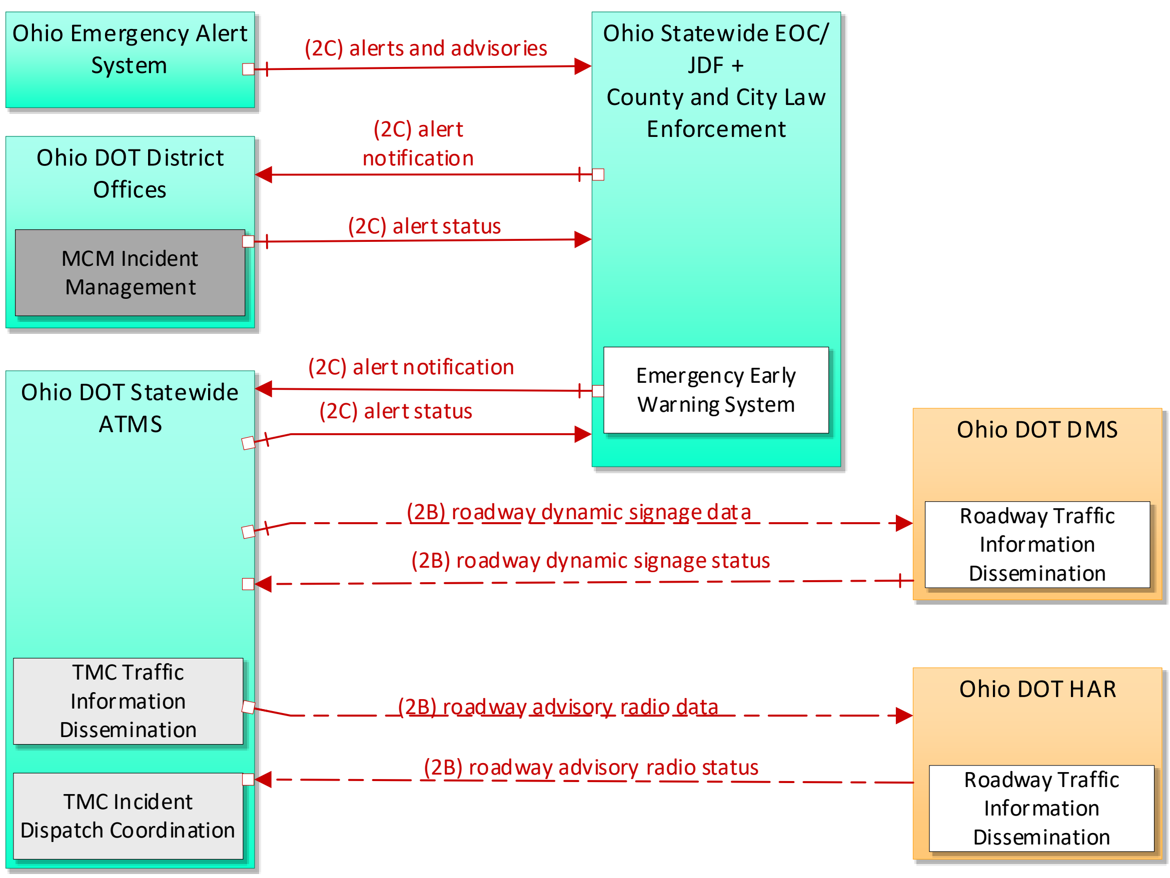
PS08: Roadway Service Patrols (Block 1) - This service package supports roadway service patrol vehicles that monitor roads and aid motorists, offering rapid response to minor incidents (flat tire, accidents, out of gas) to minimize disruption to the traffic stream. If problems are detected, the roadway service patrol vehicles will provide assistance to the motorist (e.g., push a vehicle to the shoulder or median). The service package monitors service patrol vehicle locations and supports vehicle dispatch to identified incident locations. Incident information collected by the service patrol is shared with traffic, maintenance and construction, and traveler information systems.



2: PS08: Roadway Service Patrols (1)			
1	Based on ARC-IT Physical Diagram r2	Nov 04 2018	des

Figure 7 - PS08: Roadway Service Patrols (1)

PS10: Wide-Area Alert (Block 1) - This service package uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property. The alert includes information and instructions for transportation system operators and the traveling public, improving public safety and enlisting the public's help in some scenarios. The ITS technologies will supplement and support other emergency and homeland security alert systems such as the Emergency Alert System (EAS). When an emergency situation is reported and verified and the terms and conditions for system activation are satisfied, a designated agency broadcasts emergency information to traffic agencies, transit agencies, information service providers, toll operators, and others that operate ITS systems. The ITS systems, in turn, provide the alert information to transportation system operators and the traveling public using ITS technologies such as dynamic message signs, highway advisory radios, in-vehicle displays, transit displays, 511 traveler information systems, and traveler information web sites.



2: PS10: Wide-Area Alert (1)			
1	Based on ARC-IT Physical Diagram r6	Nov 04 2018	des

Figure 8 - PS10: Wide-Area Alert (1)

TI01: Broadcast Traveler Information – ITS (Block 1) - This service package provides a digital broadcast service that disseminates traveler information to all equipped travelers within range. It collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, air quality and weather information, and broadcasts the information to travelers using technologies such as FM subcarrier, satellite radio, cellular data broadcasts, and Internet streaming technologies.

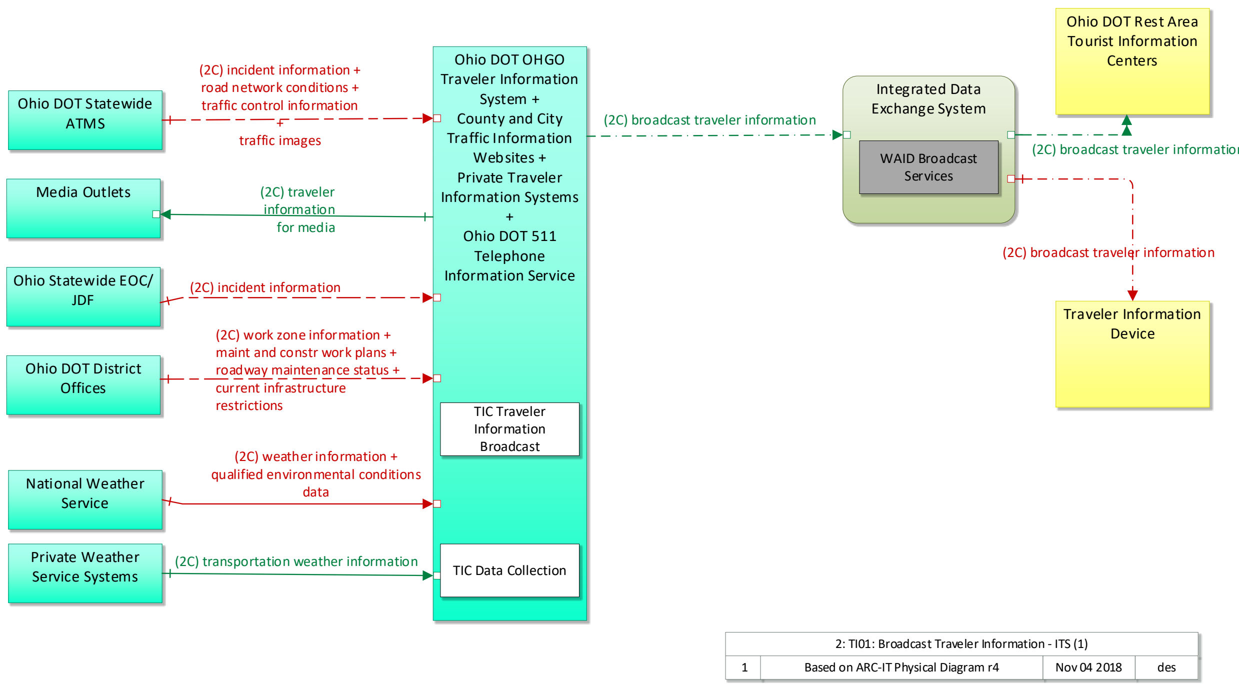
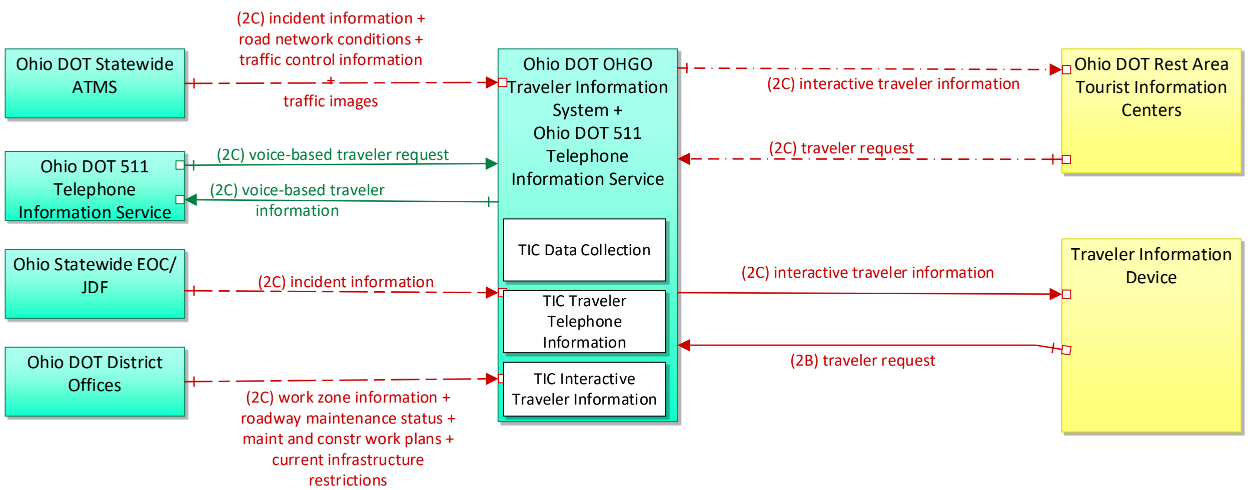


Figure 9 - TI01: Broadcast Traveler Information - ITS (1)

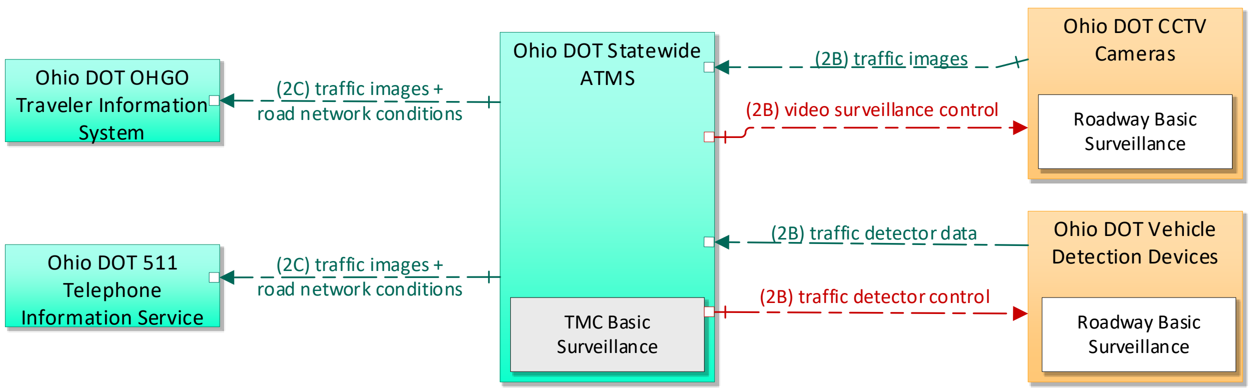
TI02: Personalized Traveler Information (Block 1) - This service package provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported. The traveler can obtain current information regarding traffic conditions, roadway maintenance and construction, transit services, ride share/ride match, parking management, detours and pricing information. Although the internet is the predominate network used for traveler information dissemination, a range of two-way wide-area wireless and fixed-point to fixed-point communications systems may be used to support the required data communications with the traveler. A variety of interactive devices may be used by the traveler to access information prior to a trip or enroute including phone via a 511-like portal and web pages via smart phone, tablet, personal computer, and a variety of in-vehicle devices.



2: Personalized Traveler Information (1)			
1	Based on ARC-IT Physical Diagram r11	Nov 07 2018	des

Figure 10 - TI02: Personalized Traveler Information (1)

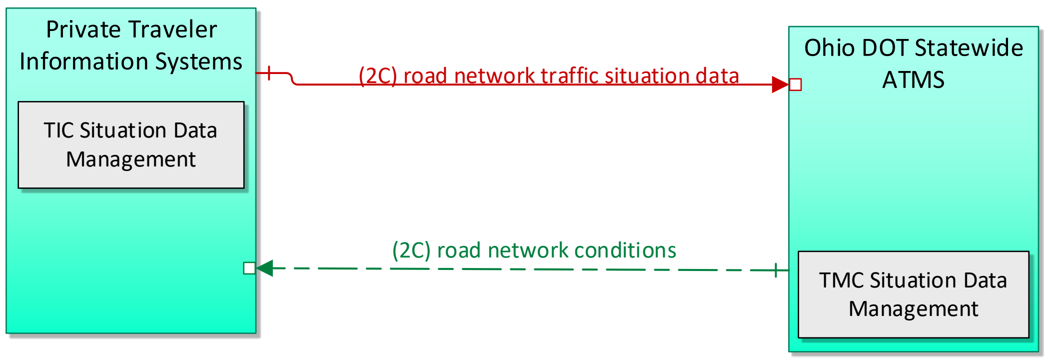
TM01: Infrastructure-Based Traffic Surveillance (Block 1) - This service package includes traffic detectors, other surveillance equipment, the supporting field equipment, and Center to Field communications to transmit the collected data back to the Traffic Management Center. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Center). The data generated by this service package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Traveler Information Center physical object.



2: TM01: Infrastructure-Based Traffic Surveillance (1)			
1	Based on ARC-IT Physical Diagram r4	Nov 04 2018	des

Figure 11 - TM01: Infrastructure-Based Traffic Surveillance (1)

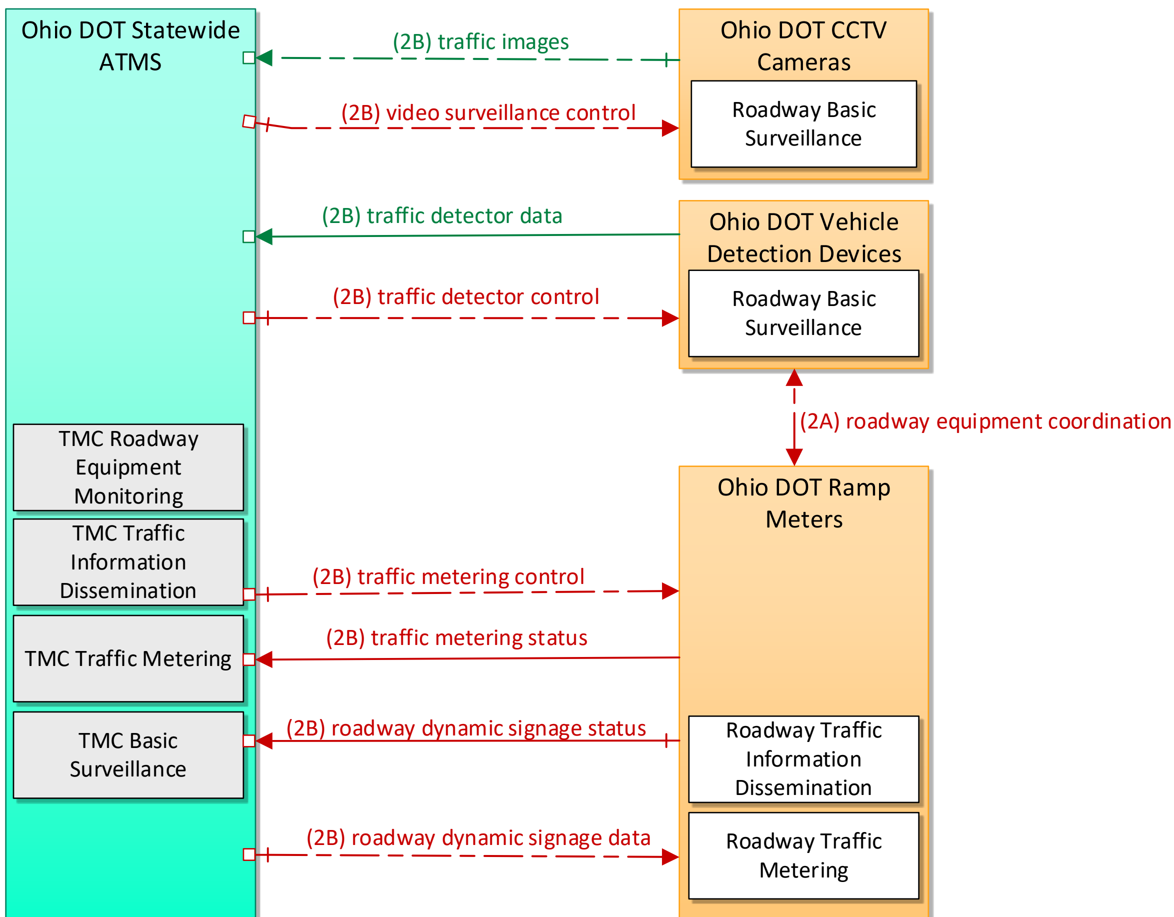
TM02: Vehicle-Based Traffic Surveillance (Block 1) - This service package uses probe data information obtained from vehicles in the network to support traffic operations, including incident detection and the implementation of localized operational strategies. Since traffic data is collected from vehicles, travel times and other related traffic performance measures are available. Incident detection enables transportation agencies to determine the location of potential incidents so the agencies can respond more quickly to the incident and mitigate any negative impacts to the transportation network.



2: TM02: Vehicle-Based Traffic Surveillance - ITS (1)			
1	Based on ARC-IT Physical Diagram r9	Nov 04 2018	des

Figure 12 - TM02: Vehicle-Based Traffic Surveillance - ITS (1)

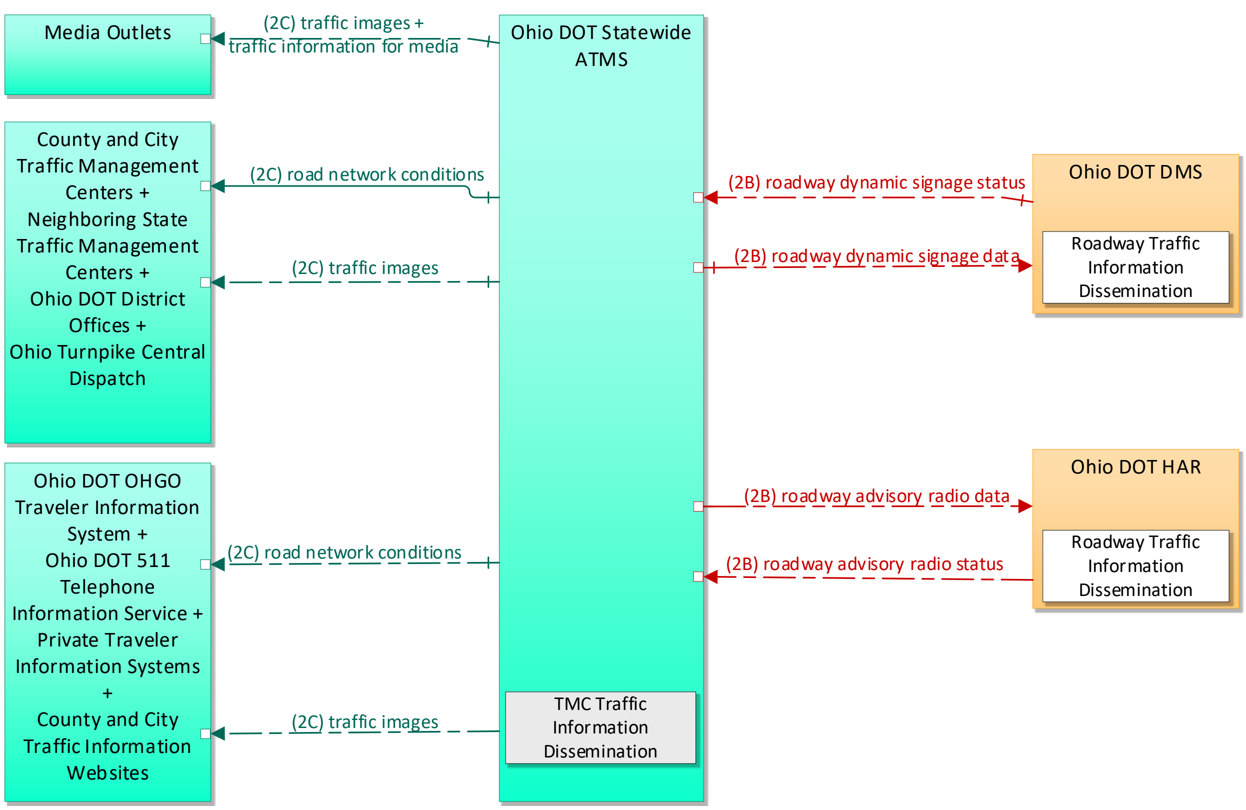
TM05: Traffic Metering (Block 1) - This service package provides central monitoring and control, communications, and field equipment that support metering of traffic. It supports the complete range of metering strategies including ramp, interchange, and mainline metering. This package incorporates the instrumentation included in the TM01 service package (traffic sensors are used to measure traffic flow and queues) to support traffic monitoring so responsive and adaptive metering strategies can be implemented. Also included is configurable field equipment to provide information to drivers approaching a meter, such as advance warning of the meter, its operational status (whether it is currently on or not, how many cars per green are allowed, etc.), lane usage at the meter (including a bypass lane for HOVs) and existing queue at the meter.



2: TM05: Traffic Metering (1)			
1	Based on ARC-IT Physical Diagram r5	Nov 04 2018	des

Figure 13 - TM05: Traffic Metering (1)

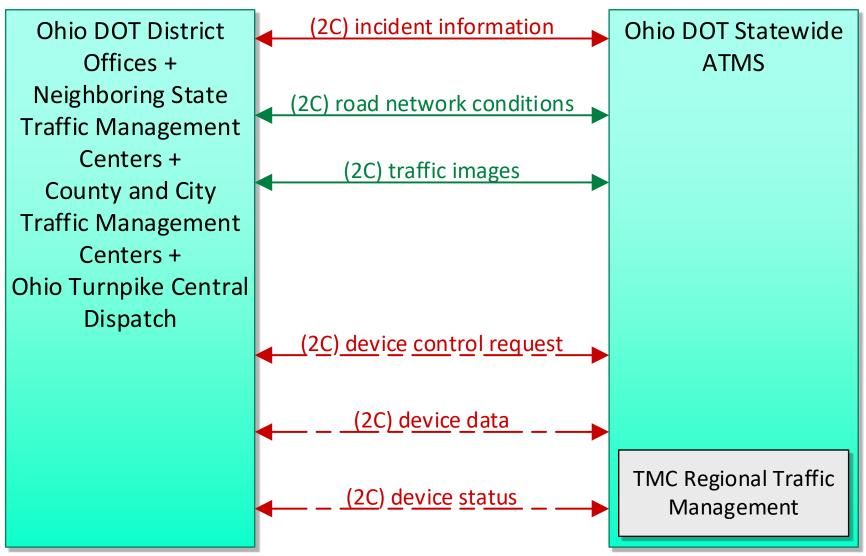
TM06: Traffic Information Dissemination (Block 1) - This service package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio. A wide range of information can be disseminated including traffic and road conditions, closure and detour information, travel restrictions, incident information, and emergency alerts and driver advisories. This package provides information to drivers at specific equipped locations on the road network. Careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Transportation Information Centers. A link to the Maintenance and Construction Management Center allows real-time information on road/bridge closures and restrictions due to maintenance and construction activities to be disseminated.



2: TM06: Traffic Information Dissemination (1)			
1	Based on ARC-IT Physical Diagram r4	Nov 07 2018	des

Figure 14 - TM06: Traffic Information Dissemination (1)

TM07: Regional Traffic Management (Block 1) - This service package provides for the sharing of information and control among traffic management centers to support regional traffic management strategies. Regional traffic management strategies that are supported include inter-jurisdictional, real-time coordinated traffic signal control systems and coordination between freeway operations and traffic signal control within a corridor. This service package advances the TM03-Traffic Signal Control and TM05-Traffic Metering service packages by adding the communications links and integrated control strategies that enable integrated, interjurisdictional traffic management. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions. This package relies principally on roadside instrumentation supported by the Traffic Signal Control and Traffic Metering service packages and adds hardware, software, and fixed-point communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. Several levels of coordination are supported from sharing of information through sharing of device control between traffic management centers.



2: TM07: Regional Traffic Management (1)			
1	Based on ARC-IT Physical Diagram r4	Nov 04 2018	des

Figure 15 - TM07: Regional Traffic Management (1)

TM08: Traffic Incident Management System (Block 1) - This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The service package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between centers. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency field personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel.

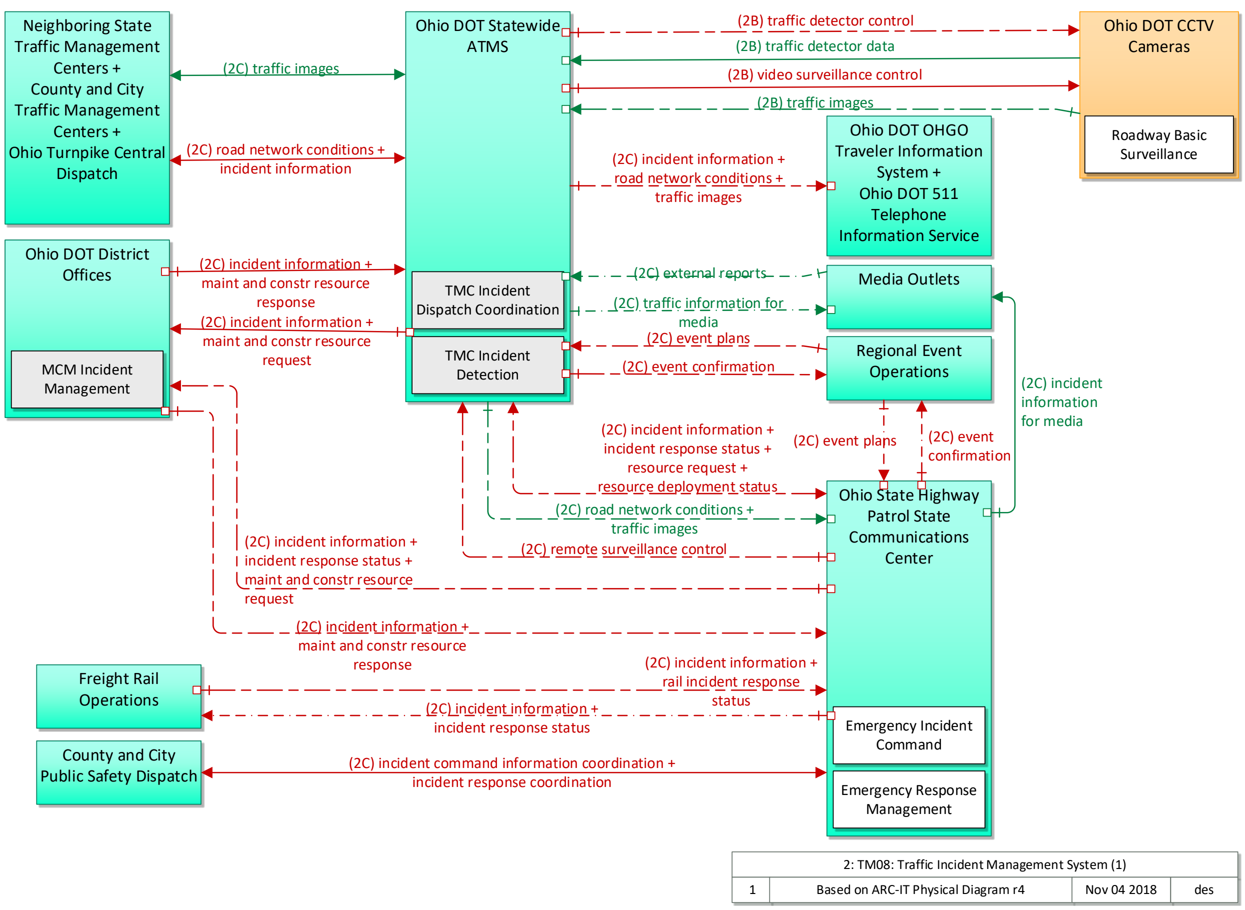


Figure 16 - TM08: Traffic Incident Management System (1)

TM09: Integrated Decision Support and Demand Management (Block 1) - This service package recommends courses of action to transportation operators in a corridor, downtown area, or other heavily traveled area. Recommendations are based on an assessment of current and forecast transportation network performance and environmental conditions. Multi-modal transportation operational strategies are created that consider all modes and all roads in the travel area to correct network imbalances and effectively manage available capacity. As part of the operational strategies, this service package may also recommend lane restrictions, transit, parking, and toll strategies to influence traveler route and mode choices to support active demand management programs and policies managing both traffic and the environment. Operational strategies, including demand management recommendations, are coordinated to support operational decisions by each transportation operator that are consistent with the recommended strategy. All recommended operational strategies are based on historical evaluation, real-time assessment, and forecast of the roadway network performance based on predicted travel demand patterns. This service package also collects air quality, parking availability, transit usage, and vehicle occupancy data to support operational strategies that manage and balance capacity and demand.

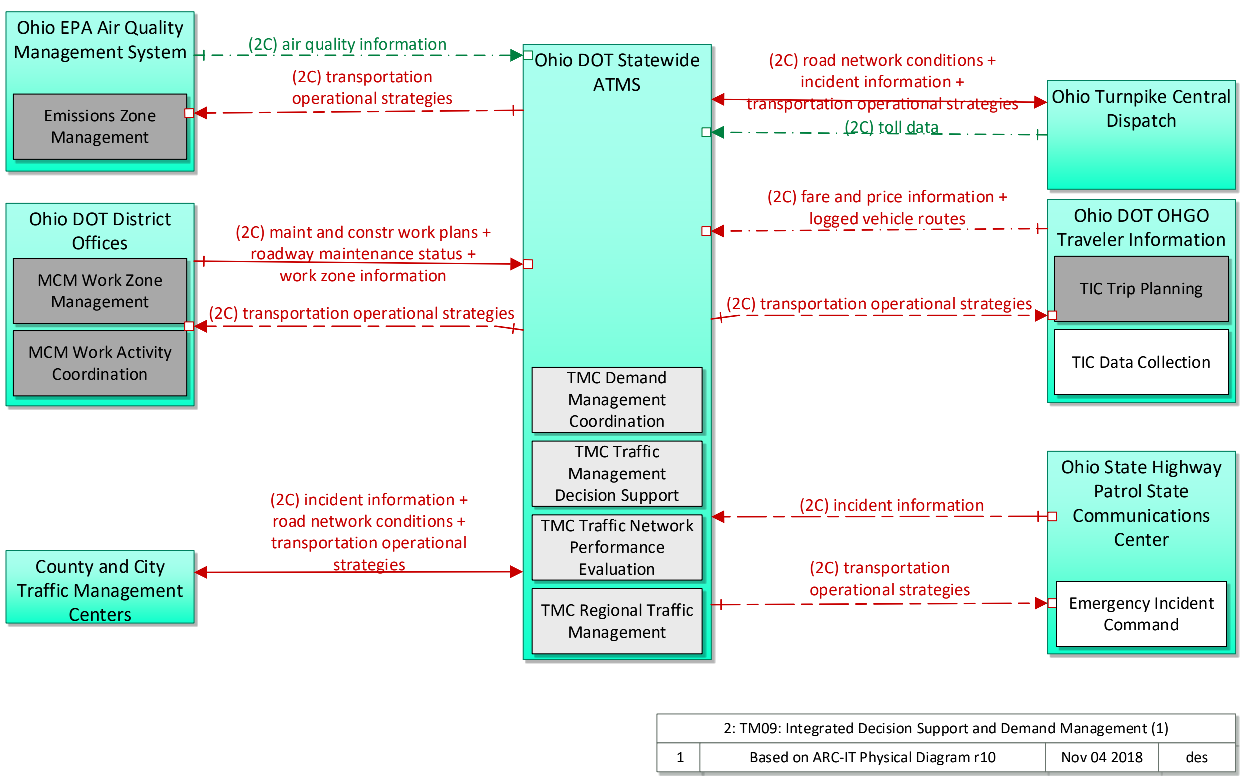
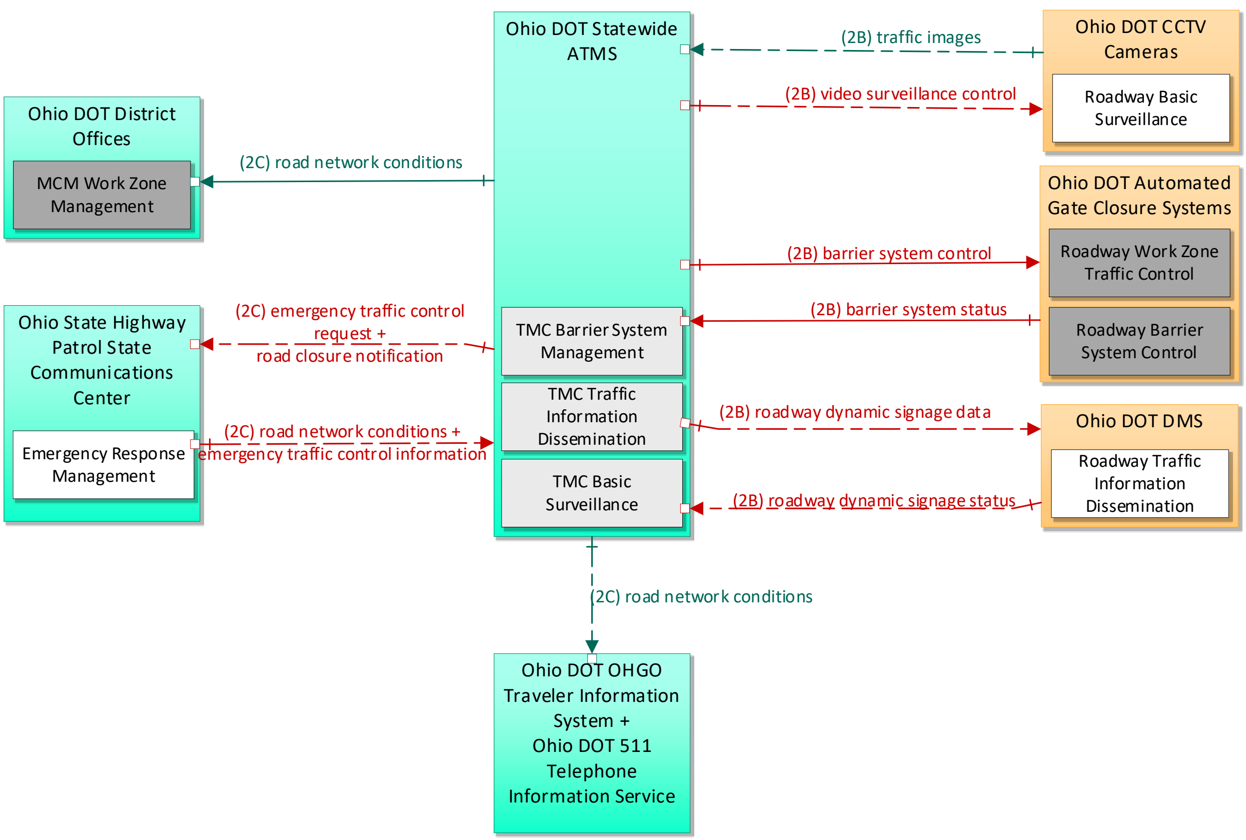


Figure 17 - TM09: Integrated Decision Support and Demand Management (1)

TM19: Roadway Closure Management (Block 1) - This service package closes roadways to vehicular traffic when driving conditions are unsafe, maintenance must be performed, and other scenarios where access to the roadway must be prohibited. The service package includes automatic or remotely controlled gates or barriers that control access to roadway segments including ramps and traffic lanes. Remote control systems allow the gates to be controlled from a central location or from a vehicle at the gate/barrier location, improving system efficiency and reducing personnel exposure to unsafe conditions during severe weather and other situations where roads must be closed. Surveillance systems allow operating personnel to visually verify the safe activation of the closure system and driver information systems (e.g., DMS) provide closure information to motorists in the vicinity of the closure. The equipment managed by this service package includes the control and monitoring systems, the field devices (e.g., gates, warning lights, DMS, CCTV cameras) at the closure location(s), and the information systems that notify other systems of a closure. This service package covers general road closure applications; specific closure systems that are used at railroad grade crossings, drawbridges, reversible lanes, etc. are covered by other Traffic Management service packages.

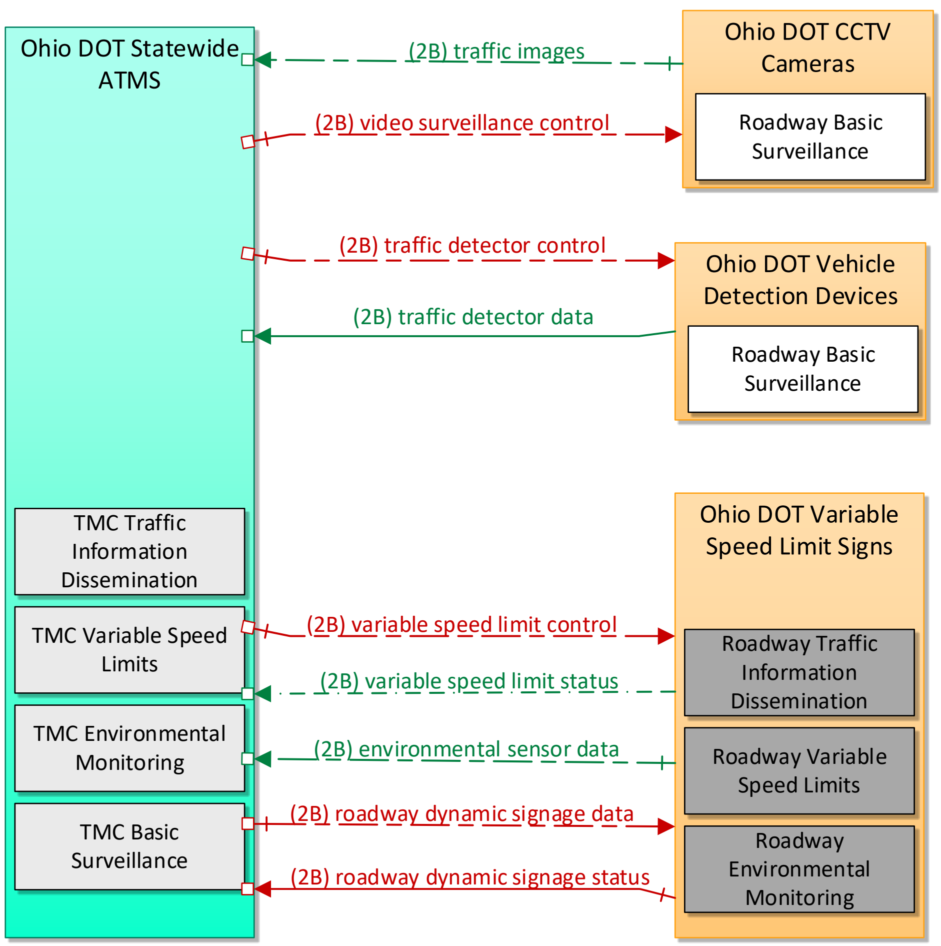


2: TM19: Roadway Closure Management (1)			
1	Based on ARC-IT Physical Diagram r5	Nov 04 2018	des

Figure 18 - TM19: Roadway Closure Management (1)

TM20: Variable Speed Limits (Block 1) - This service package sets variable speed limits along a roadway to create more uniform speeds, to promote safer driving during adverse conditions (such as fog), and/or to reduce air pollution. Also known as speed harmonization, this service monitors traffic and environmental conditions along the roadway. Based on the measured data, the system calculates and sets suitable speed limits, usually by lane. Equipment over and along the roadway displays the speed limits and additional information such as basic safety rules and current traffic information. The system can be centrally monitored and controlled by a traffic management center or it can be autonomous.

This service establishes variable speed limits and communicates the speed limits to drivers. Variable speed limits are an Active Traffic Management (ATM) strategy and are typically used in conjunction with other ATM strategies (such as TM22-Dynamic Lane Management and Shoulder Use).

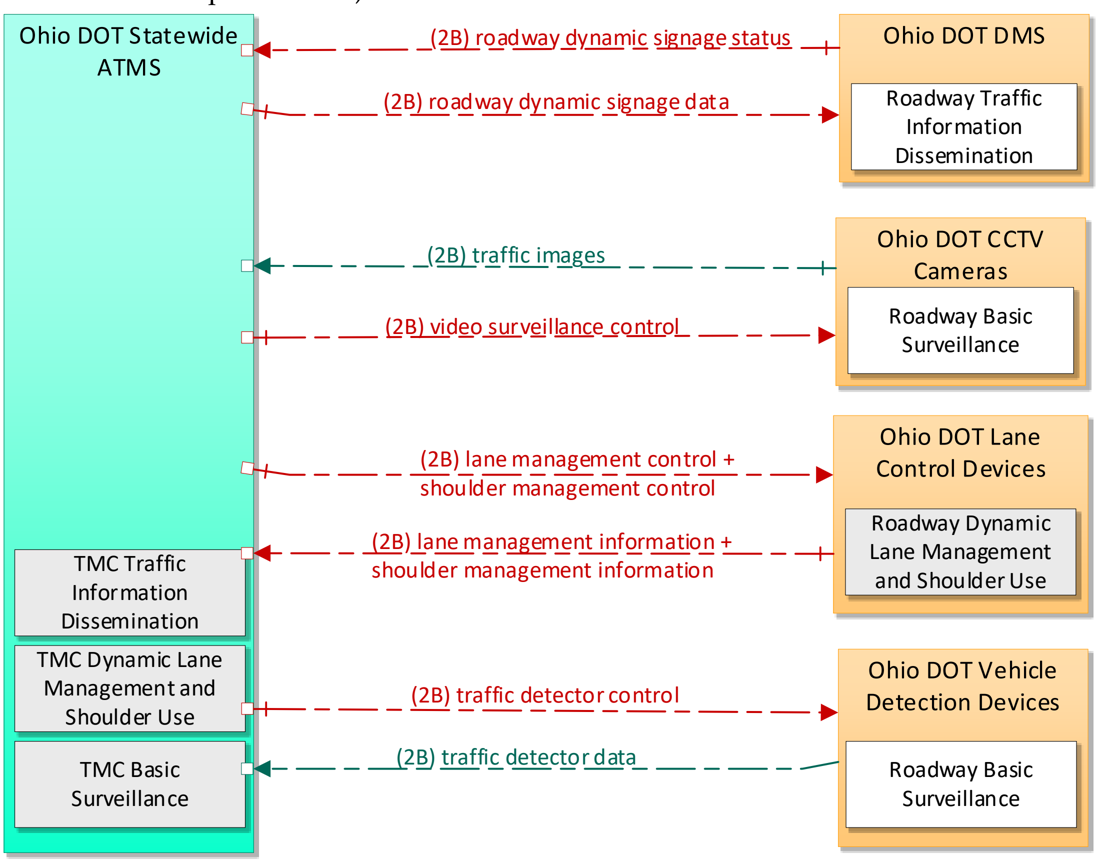


2: TM20: Variable Speed Limits (1)			
1	Based on ARC-IT Physical Diagram r1	Nov 04 2018	des

Figure 19 - TM20: Variable Speed Limits (1)

TM22: Dynamic Lane Management and Shoulder Use – ITS (Block 1) - This service package provides for active management of travel lanes along a roadway. The package includes the field equipment, physical overhead lane signs and associated control electronics that are used to manage and control specific lanes and/or the shoulders. This equipment can be used to change the lane configuration on the roadway according to traffic demand and lane destination along a typical roadway section or on approach to or access from a border crossing, multimodal crossing or intermodal freight depot. This package can be used to allow temporary or interim use of shoulders as travel lanes. The equipment can be used to electronically reconfigure intersections and interchanges and manage right-of-way dynamically including merges. Also, lanes can be designated for use by special vehicles only, such as buses, high occupancy vehicles (HOVs), vehicles attending a special event, etc. Prohibitions or restrictions of types of vehicles from using particular lanes can be implemented.

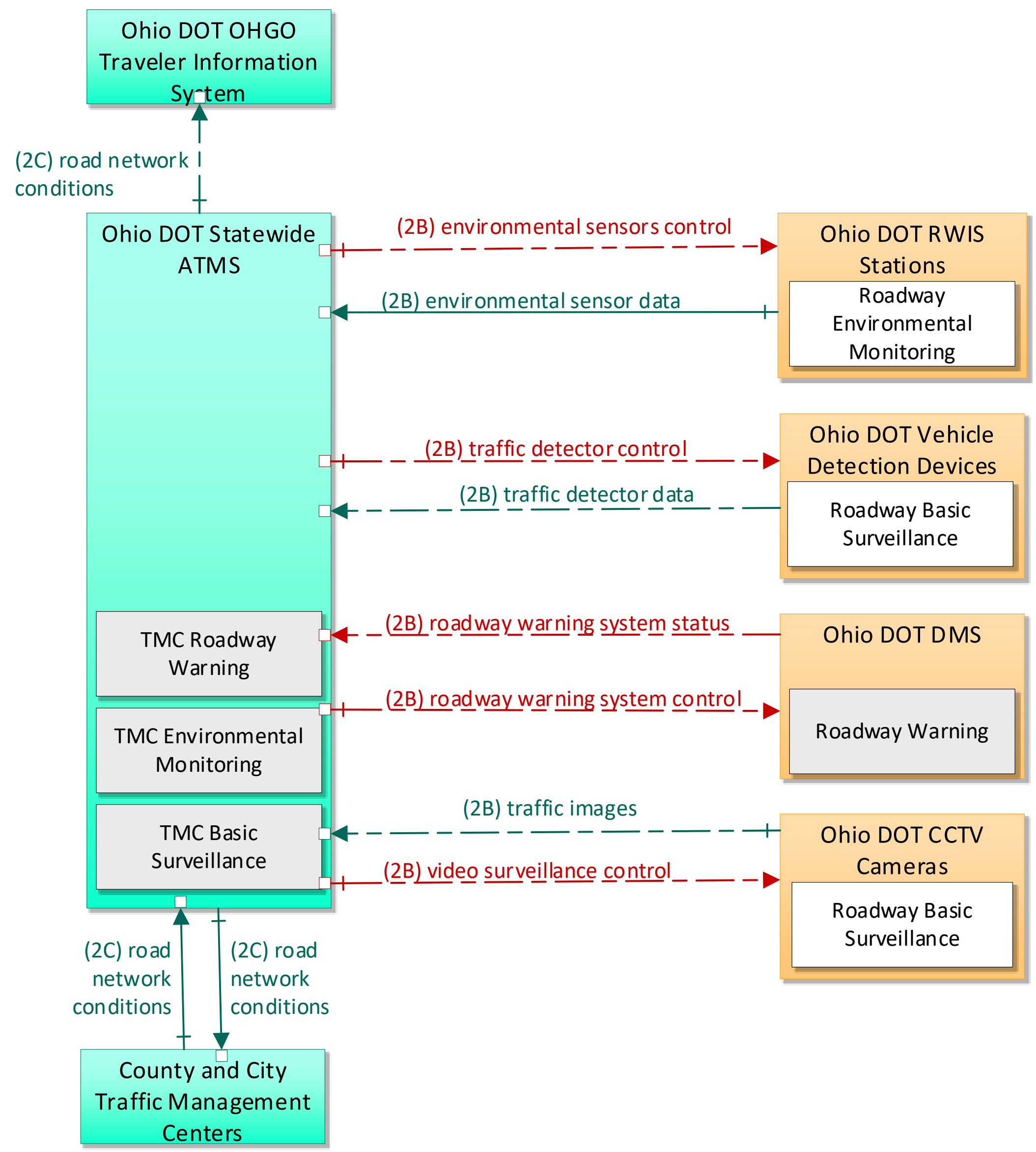
The lane management system can be centrally monitored and controlled by a traffic management center or it can be autonomous. Dynamic lane management and shoulder use is an Active Traffic Management (ATM) strategy and is typically used in conjunction with other ATM strategies (such as TM20-Variable Speed Limits).



2: TM22: Dynamic Lane Management and Shoulder Use - ITS (1)			
1	Based on ARC-IT Physical Diagram r3	Nov 04 2018	des

Figure 20 - TM22: Dynamic Lane Management and Shoulder Use - ITS (1)

VS08: Queue Warning – ITS (Block 1) - This service package utilizes DMS and traveler information systems to broadcast queue warnings to vehicles in order to minimize or prevent rear-end or other secondary collisions. This service package is not intended to operate as a crash avoidance system. In contrast to such systems, this service package will engage well in advance of any potential crash situation, providing messages and information to the driver in order to minimize the likelihood of his needing to take crash avoidance or mitigation actions later. It performs two essential tasks: queue determination (detection and/or prediction) and queue information dissemination using DMS or traveler information systems.



2: VS08: Queue Warning - ITS (1)			
1	Based on ARC-IT Physical Diagram r6	Nov 07 2018	des

Figure 21 - VS08: Queue Warning - ITS (1)

WX01: Weather Data Collection (Block 1) - This service package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. It also collects data from vehicles in the road network that can be used to directly measure or infer current environmental conditions. It leverages vehicle on-board systems that measure temperature, sense current weather conditions (rain and sun sensors) and also can monitor aspects of the vehicle operational status (e.g., use of headlights, wipers, and traction control system) to gather information about local environmental conditions. In addition, environmental sensor systems located on Maintenance and Construction Vehicles are also potential data sources. The collected environmental data is used by the Weather Information Processing and Distribution service package to process the information and make decisions on operations. The collected environmental data may be aggregated, combined with data attributes and sent to meteorological systems for data qualification and further data consolidation. The service package may also request and receive qualified data sets from meteorological systems.

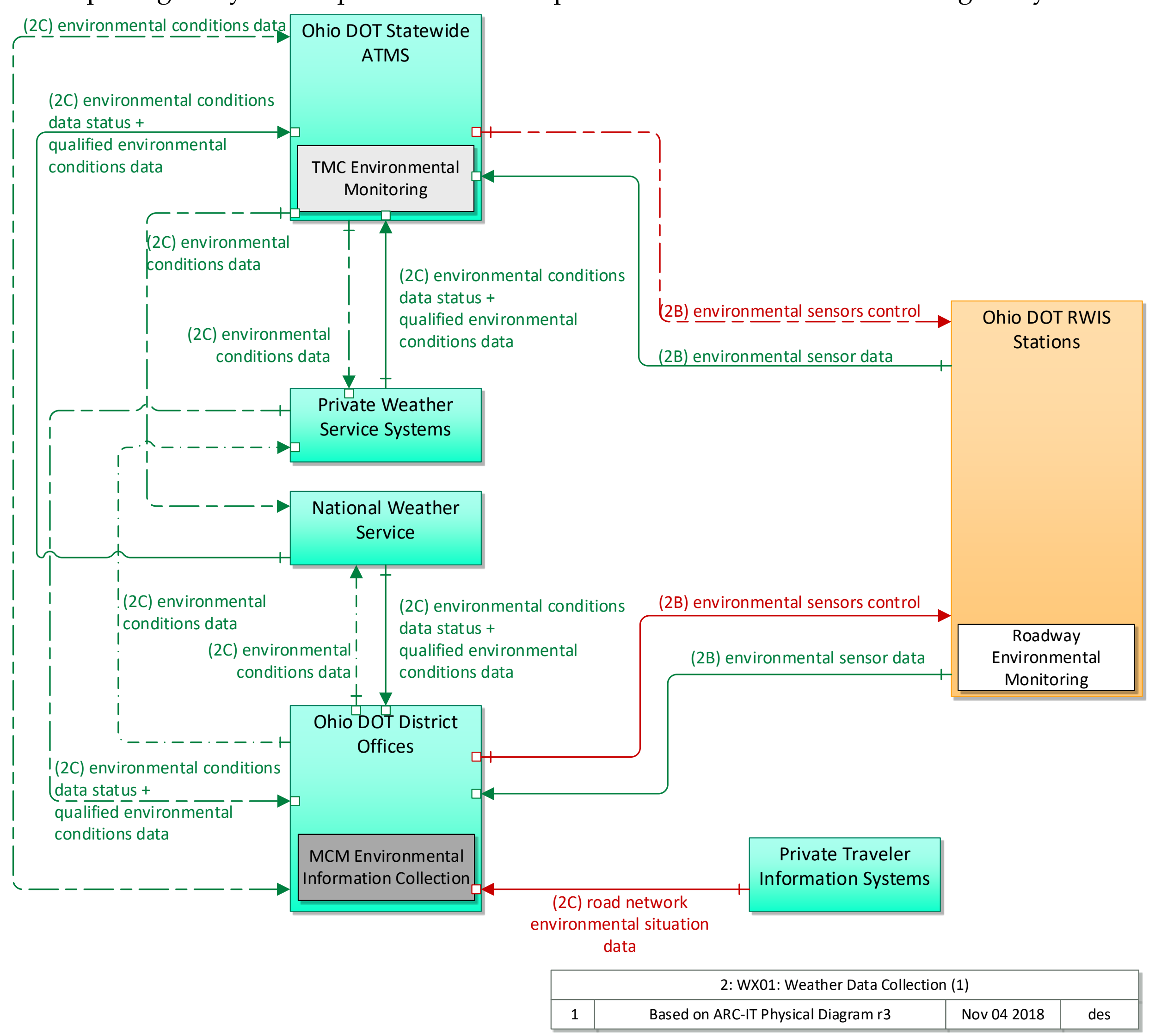
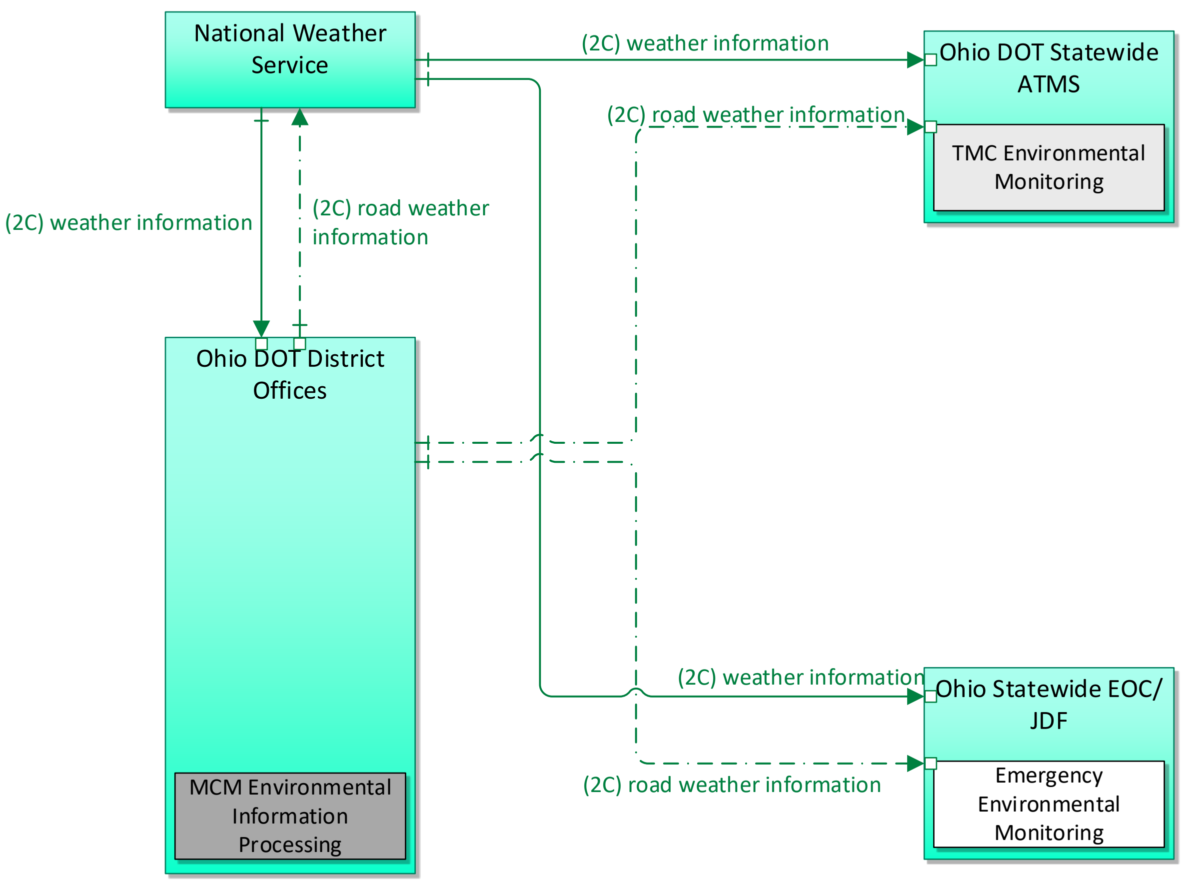


Figure 22 - WX01: Weather Data Collection (1)

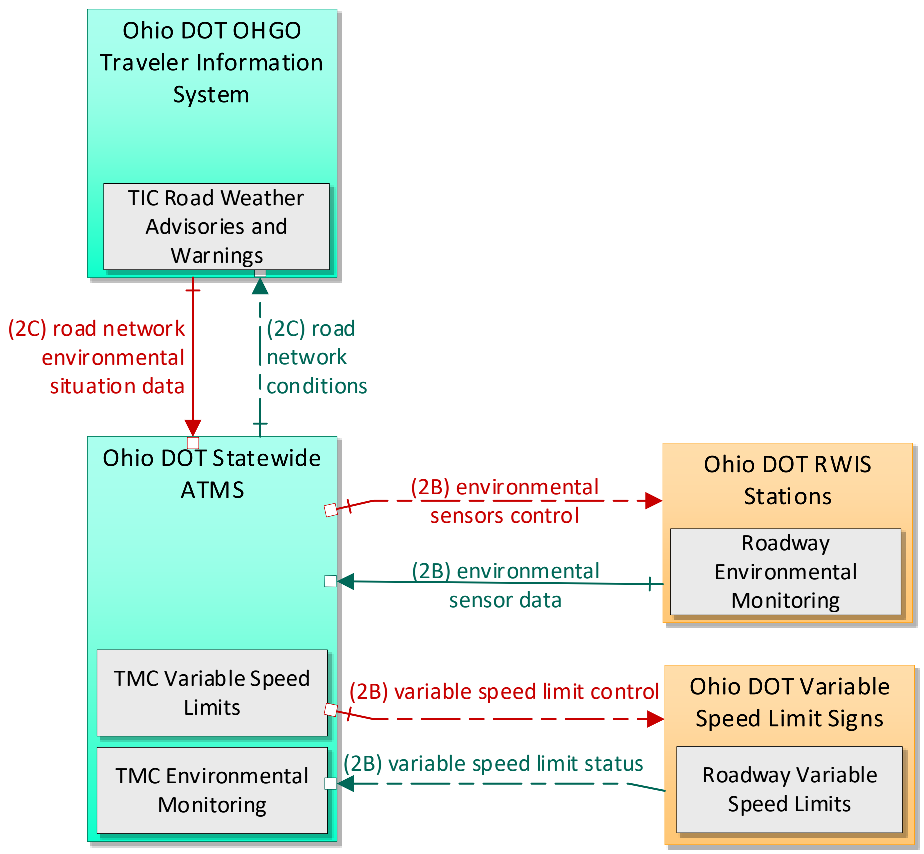
WX02: Weather Information Processing and Distribution (Block 1) - This service package processes and distributes the environmental information collected from the Weather Data Collection service package. This service package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so operational centers and decision support systems can make decision on corrective actions to take. The continuing updates of road condition information and current temperatures can be used to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination service package, and aid operators in scheduling work activity.



2: WX02: Weather Information Processing and Distribution (1)			
1	Based on ARC-IT Physical Diagram r6	Nov 04 2018	des

Figure 23 - WX02: Weather Information Processing and Distribution (1)

WX03: Spot Weather Impact Warning – ITS (Block 1) - This service package will alert drivers to unsafe conditions or road closure at specific points on the downstream roadway as a result of weather-related impacts, which include, but are not limited to high winds, flood conditions, ice, or fog. The service packages is designed to use standalone weather systems to warn drivers about inclement weather conditions that may impact travel conditions. Real-time weather information is collected from fixed environmental sensor stations. The information is processed to determine the nature of the alert or warning to be delivered and then communicated to travelers. The alerts or warnings will be provided via roadway signage. In addition, the roadway equipment may calculate the appropriate speed for current weather conditions and provide this information on roadway signage.

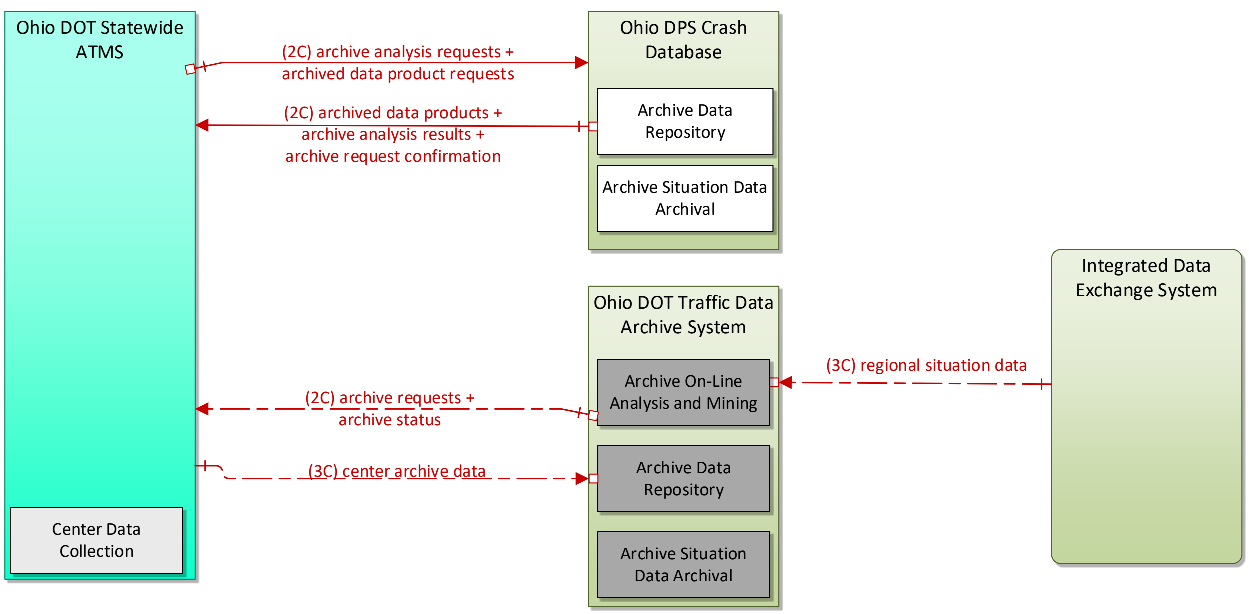


2: WX03: Spot Weather Impact Warning - ITS (1)			
1	Based on ARC-IT Physical Diagram r6	Nov 04 2018	des

Figure 24 - WX03: Spot Weather Impact Warning - ITS (1)

Block 2 Service Packages

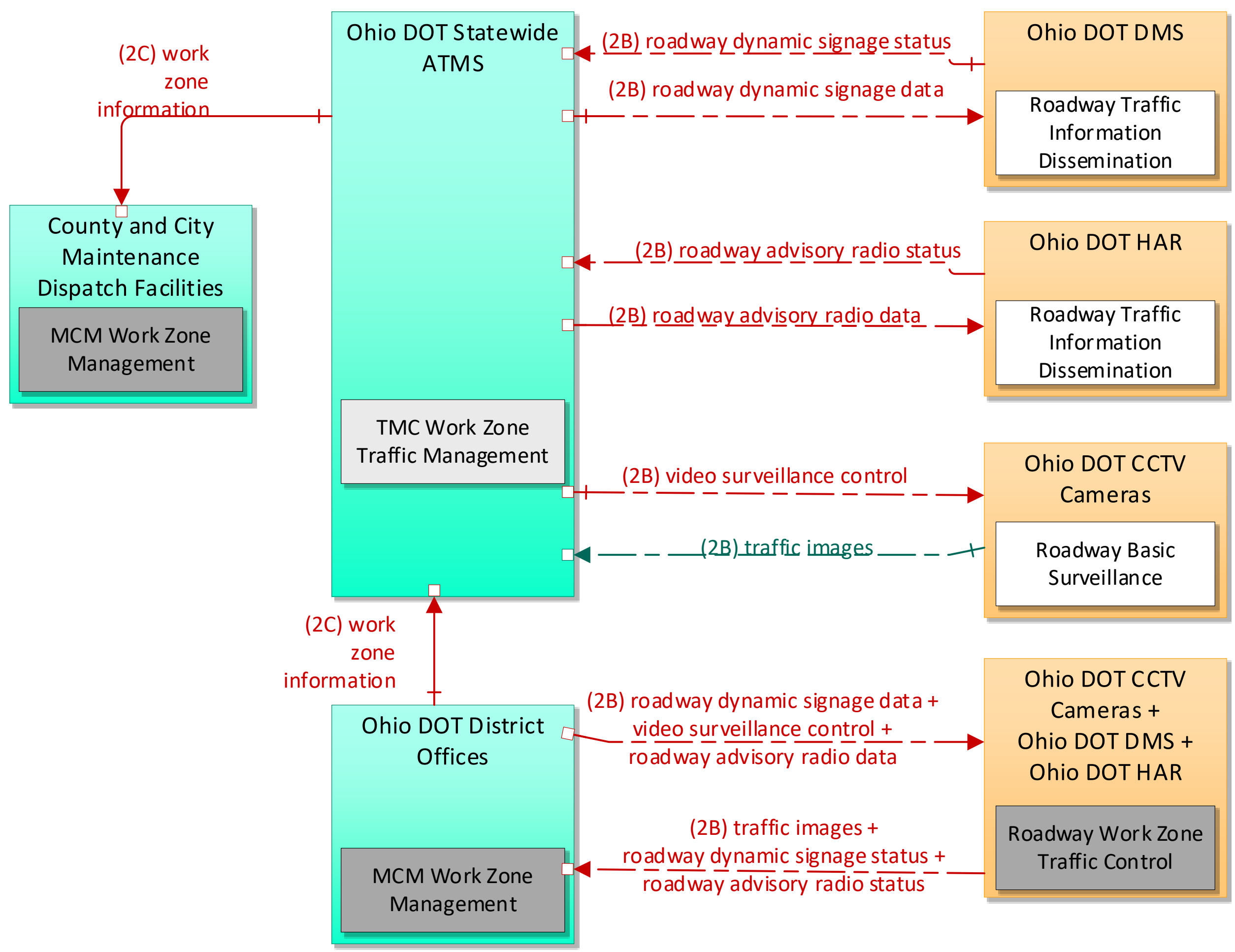
DM02: Performance Monitoring (Block 2) - The Performance Monitoring service package uses information collected from detectors and sensors, connected vehicles, and operational data feeds from centers to support performance monitoring and other uses of historical data including transportation planning, condition monitoring, safety analyses, and research. The information may be probe data information obtained from vehicles in the network to determine network performance measures such as speed and travel times, or it may be information collected from the vehicles and processed by the infrastructure, e.g. environmental data and infrastructure conditions monitoring data. Additional data are collected including accident data, road condition data, road closures and other operational decisions to provide context for measured transportation performance and additional safety and mobility-related measures. More complex performance measures may be derived from the collected data.



2: DM02: Performance Monitoring (2)			
1	Based on ARC-IT Physical Diagram r6	Nov 04 2018	des

Figure 25 - DM02: Performance Monitoring (2)

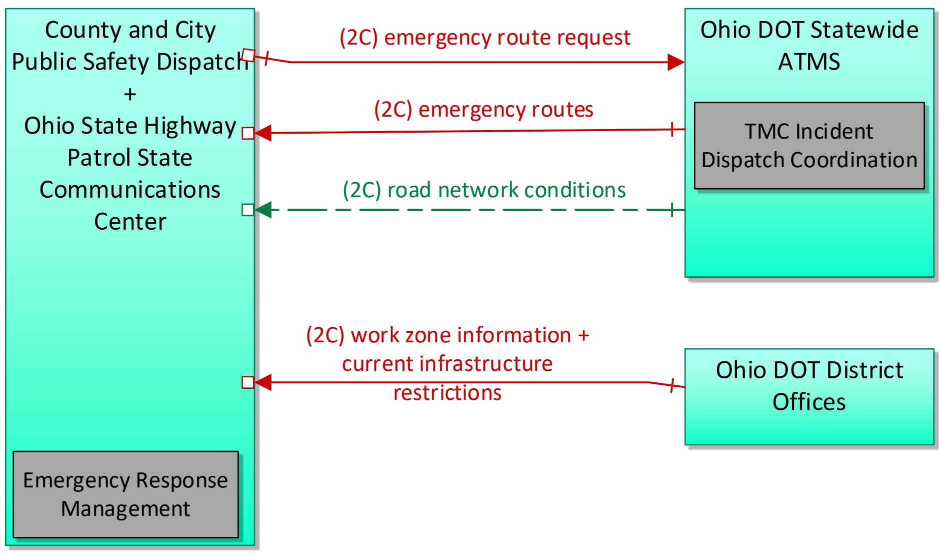
MC06: Work Zone Management – ITS (Block 2) - This service package manages work zones, controlling traffic in areas of the roadway where maintenance, construction, and utility work activities are underway. Traffic conditions are monitored using CCTV cameras and controlled using dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers. Work zone information is coordinated with other groups (e.g., TIC, traffic management, other maintenance and construction centers). Work zone speeds and delays are provided to the motorist prior to the work zones. This service package provides control of field equipment in all maintenance and construction areas, including fixed, portable, and truck-mounted devices supporting both stationary and mobile work zones.



2: MC06: Work Zone Management - ITS (2)			
1	Based on ARC-IT Physical Diagram r6	Nov 04 2018	des

Figure 26 - MC06: Work Zone Management - ITS (2)

PS02: Routing Support for Emergency Responders (Block 2) - This service package provides information to support dynamic routing of emergency vehicles. Traffic information, road conditions, and weather advisories are provided to enhance emergency vehicle routing. The Emergency Management Center provides routing information based on real-time conditions and has the option to request an ingress/egress route from the Traffic Management Center.



2: PS02: Routing Support for Emergency Responders (2)			
1	Based on ARC-IT Physical Diagram r9	Nov 04 2018	des

Figure 27 - PS02: Routing Support for Emergency Responders (2)

PS11: Early Warning System (Block 2) - This service package monitors and detects potential, looming, and actual disasters including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and acts of terrorism including nuclear, chemical, biological, and radiological weapons attacks). The service package monitors alerting and advisory systems, ITS sensors and surveillance systems, field reports, and emergency call-taking systems to identify emergencies and notifies all responding agencies of detected emergencies.

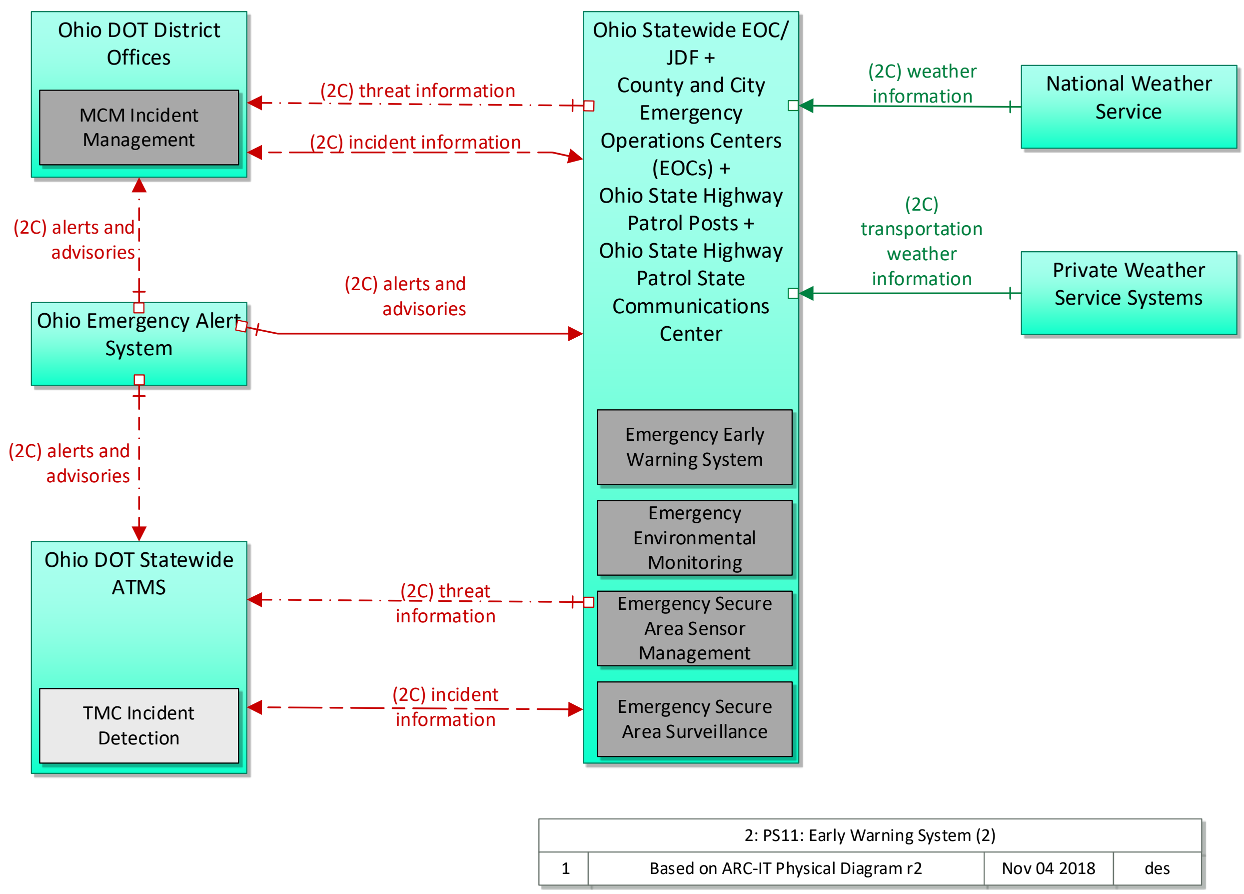


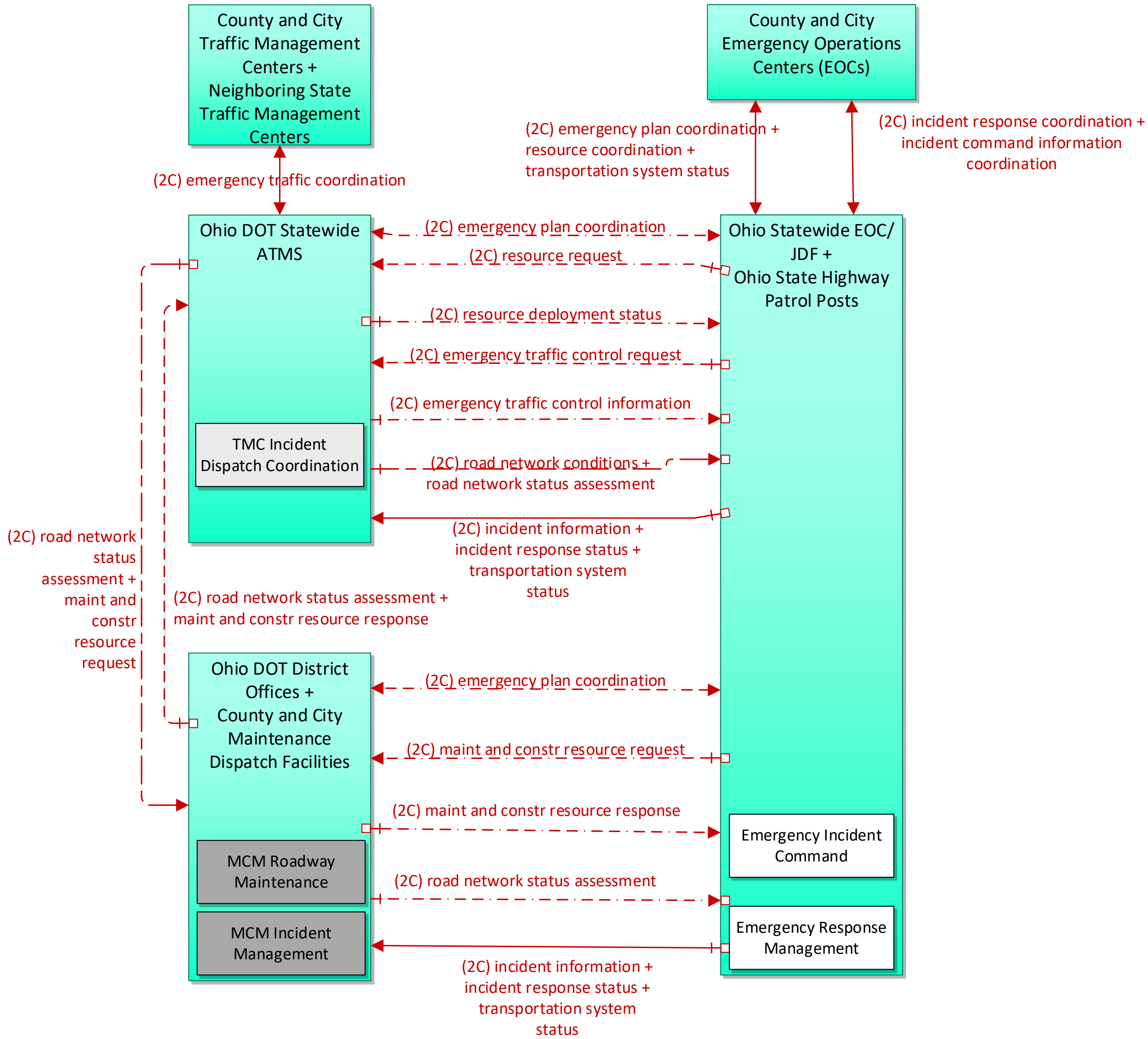
Figure 28 - PS11: Early Warning System (2)

PS12: Disaster Response and Recovery (Block 2) - This service package enhances the ability of the surface transportation system to respond to and recover from disasters. It addresses the most severe incidents that require an extraordinary response from outside the local community. All types of disasters are addressed including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and national security emergencies such as nuclear, chemical, biological, and radiological weapons attacks).

The service package supports coordination of emergency response plans, including general plans developed before a disaster as well as specific tactical plans with short time horizon that are developed as part of a disaster response. The service package provides enhanced access to the scene for response personnel and resources, provides better information about the transportation system in the vicinity of the disaster, and maintains situation awareness regarding the disaster itself. In addition, this service package tracks and coordinates the transportation resources - the transportation professionals, equipment, and materials - that constitute a portion of the disaster response.

The service package identifies the key points of integration between transportation systems and the public safety, emergency management, public health, and other allied organizations that form the overall disaster response. In this service package, the Emergency Management Center represents the federal, regional, state, and local Emergency Operations Centers and the Incident Commands that are established to respond to the disaster. The interface between the Emergency Management Center and the other centers provides situation awareness and resource coordination among transportation and other allied response agencies. In its role, traffic management implements special traffic control strategies and detours and restrictions to effectively manage traffic in and around the disaster. Maintenance and construction provides damage assessment of road network facilities and manages service restoration. Transit management provides a similar assessment of status for transit facilities and modifies transit operations to meet the special demands of the disaster. As immediate public safety concerns are addressed and disaster response transitions into recovery, this service package supports transition back to normal transportation system operation, recovering resources, managing on-going transportation facility repair, supporting data collection and revised plan coordination, and other recovery activities.

This service package builds on the basic traffic incident response service that is provided by TM08, the Traffic Incident Management service package. This service package addresses the additional complexities and coordination requirements that are associated with the most severe incidents that warrant an extraordinary response from outside the local jurisdictions and require special measures such as the activation of one or more emergency operations centers. Many users of ARC-IT will want to consider both TM08 and this service package since every region is concerned with both day-to-day management of traffic-related incidents and occasional management of disasters that require extraordinary response.

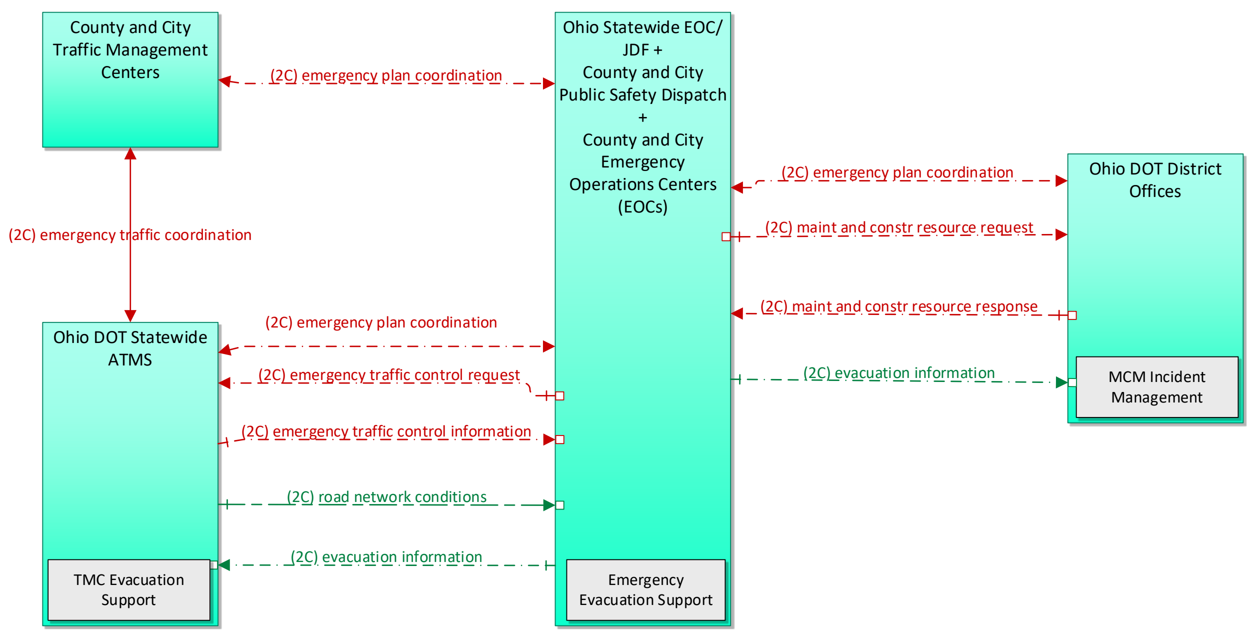


2: PS12: Disaster Response and Recovery (2)			
1	Based on ARC-IT Physical Diagram r3	Nov 04 2018	des

Figure 29 - PS12: Disaster Response and Recovery (2)

PS13: Evacuation and Reentry Management (Block 2) - This service package supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. The service package addresses evacuations for all types of disasters, including disasters like hurricanes that are anticipated and occur slowly, allowing a well-planned orderly evacuation, as well as disasters like terrorist acts that occur rapidly, without warning, and allow little or no time for preparation or public warning.

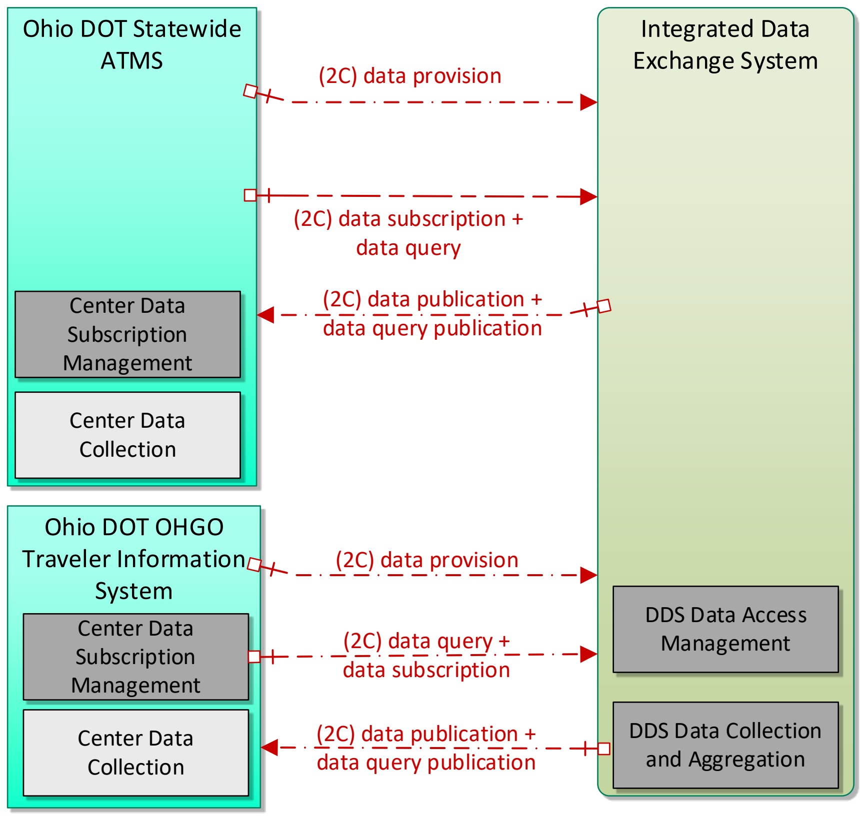
This service package supports coordination of evacuation plans among the federal, state, and local transportation, emergency, and law enforcement agencies that may be involved in a large-scale evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. Information is shared with traffic management agencies to implement special traffic control strategies and to control evacuation traffic, including traffic on local streets and arterials as well as the major evacuation routes. Reversible lanes, shoulder use, closures, special signal control strategies, and other special strategies may be implemented to maximize capacity along the evacuation routes. Transit resources play an important role in an evacuation, removing many people from an evacuated area while making efficient use of limited capacity. Additional shared transit resources may be added and managed in evacuation scenarios. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times.



2: PS13: Evacuation and Reentry Management (2)			
1	Based on ARC-IT Physical Diagram r3	Nov 04 2018	des

Figure 30 - PS13: Evacuation and Reentry Management (2)

SU03: Data Distribution – ITS (Block 2) - This service package manages the distribution of data from data providers to data consumers and protects those data from unauthorized access. It informs data providers of how to provide data, manages data subscriptions, and provides data forwarding capabilities. The service package also maintains a directory of System Users that want data and supports multiple distribution mechanisms including publish-subscribe and directly from data provider to data consumer. It allows data consumers to specify (and change the specification of) data they wish to receive.



2: SU03: Data Distribution - ITS (2)			
1	Based on ARC-IT Physical Diagram r9	Nov 04 2018	des

Figure 31 - SU03: Data Distribution - ITS (2)

SU08: Security and Credentials Management – ITS (Block 2) - This service package is used to ensure trusted communications between mobile devices and other mobile devices or roadside devices and protect data they handle from unauthorized access. The service package grants trust credentials to qualified mobile devices and infrastructure devices so that those devices may be considered trusted by other devices that receive trust credentials from the SCM service package. The service package allows credentials to be requested and revoked and secures the exchange of trust credentials between parties, so that no other party can intercept and use those credentials illegitimately. The service package provides security to the transmissions between connected devices, ensuring authenticity and integrity of the transmissions. Additional security features include privacy protection, authorization and privilege class definition, as well as non-repudiation of origin.

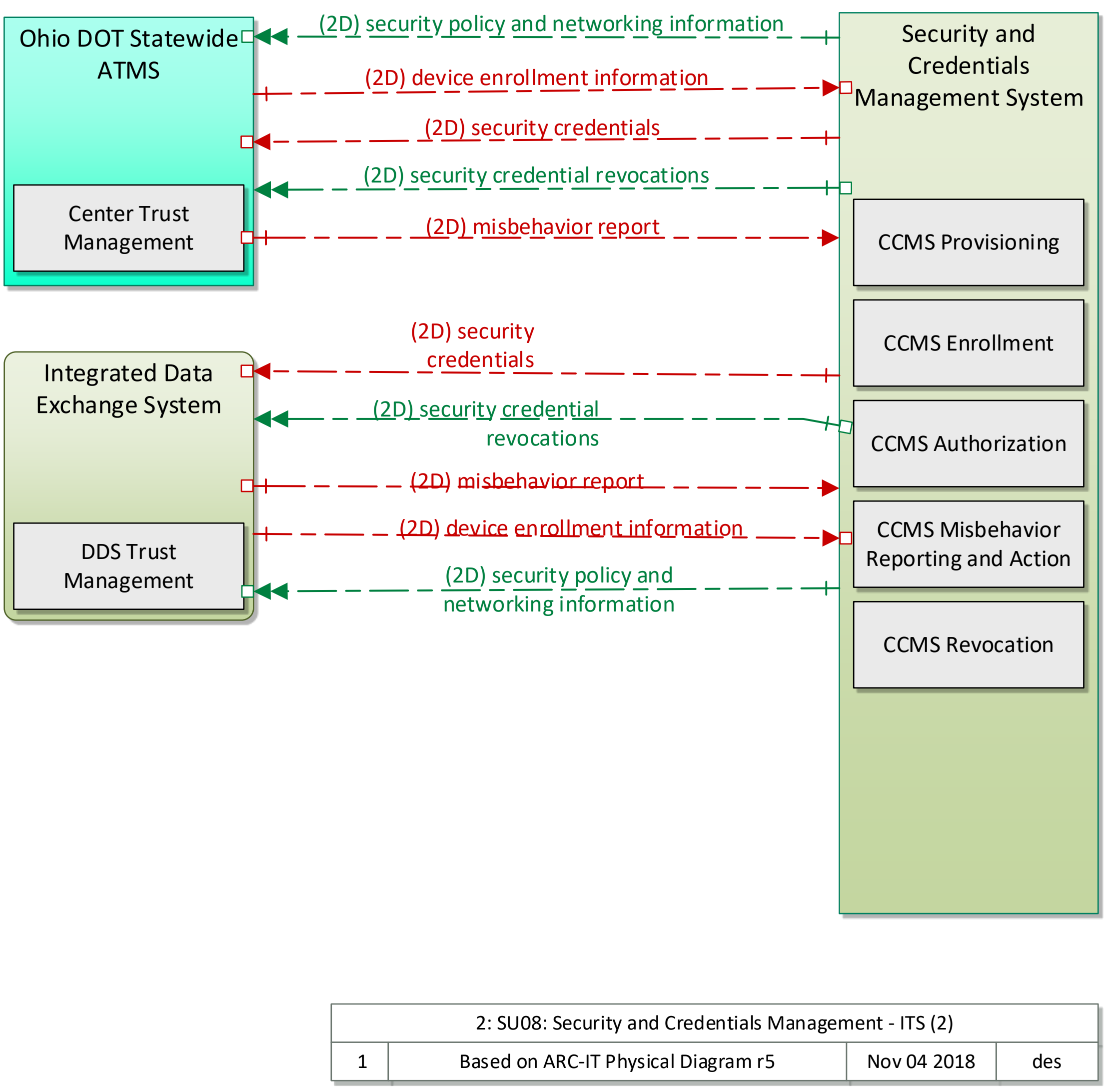
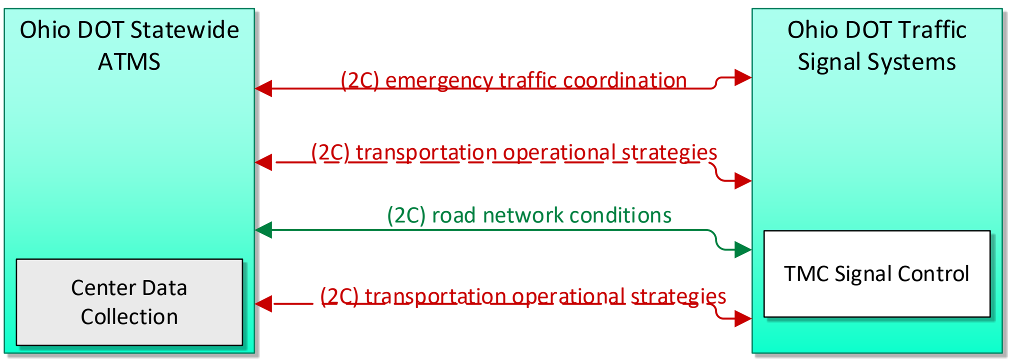


Figure 32 - SU08: Security and Credentials Management - ITS (2)

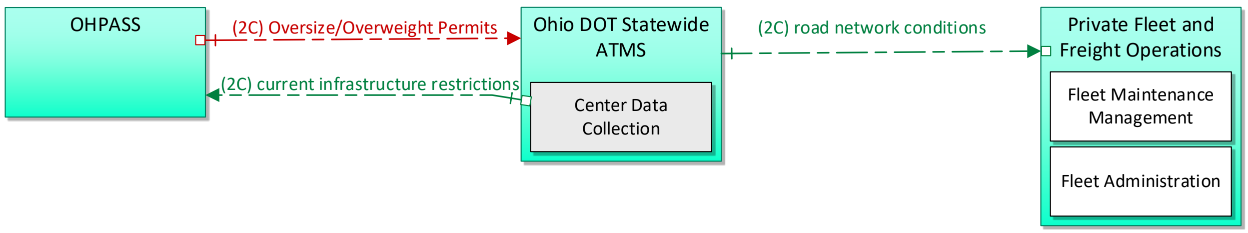
TM03: Traffic Signal Control (Block 2) - This service package provides the central control and monitoring equipment, communication links, and the signal control equipment that support traffic control at signalized intersections. A range of traffic signal control systems are represented by this service package ranging from fixed-schedule control systems to fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests. This service package is generally an intra-jurisdictional package. Systems that achieve coordination across jurisdictions by using a common time base or other strategies that do not require real time coordination would also be represented by this package. Coordination of traffic signal systems using real-time communications is covered in the TM07-Regional Traffic Management service package. This service package is consistent with typical traffic signal control systems.



2: TM03: Traffic Signal Control (2)			
1	Based on ARC-IT Physical Diagram r4	Nov 04 2018	des

Figure 33 – TM03: Traffic Signal Control (2)

CVOOps: Carrier Permitting (Block 2) - This service package communicates oversize/overweight permitting information to the ATMS. The ATMS provides traffic conditions to the fleet operator concerning changes in route conditions. The location of the Commercial Vehicle can be monitored by the Fleet and Freight Management Center and routing changes can be made depending on current road network conditions.



2: CVOOps: Carrier Permitting (2)			
1	Based on ARC-IT Physical Diagram r7	Nov 07 2018	des

Figure 34 - CVOOps: Carrier Permitting (2)

Block 3 Service Packages

MC06CV: Work Zone Management – CV (Block 3) - This service package manages work zones, controlling traffic in areas of the roadway where maintenance, construction, and utility work activities are underway. Traffic conditions are monitored using CCTV cameras and controlled using dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers. Work zone information is coordinated with other groups (e.g., TIC, traffic management, other maintenance and construction centers). Work zone speeds and delays are provided to the motorist prior to the work zones. This service package provides control of field equipment in all maintenance and construction areas, including fixed, portable, and truck-mounted devices supporting both stationary and mobile work zones.

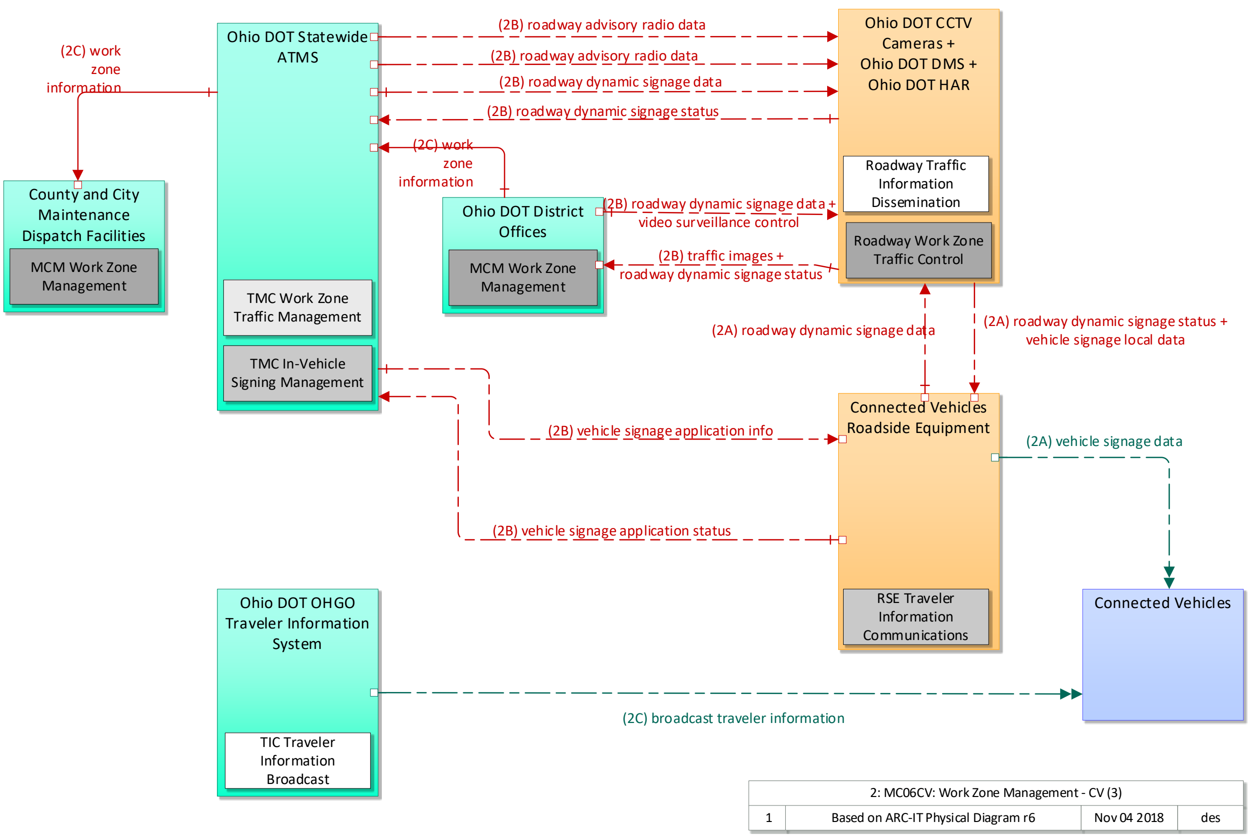
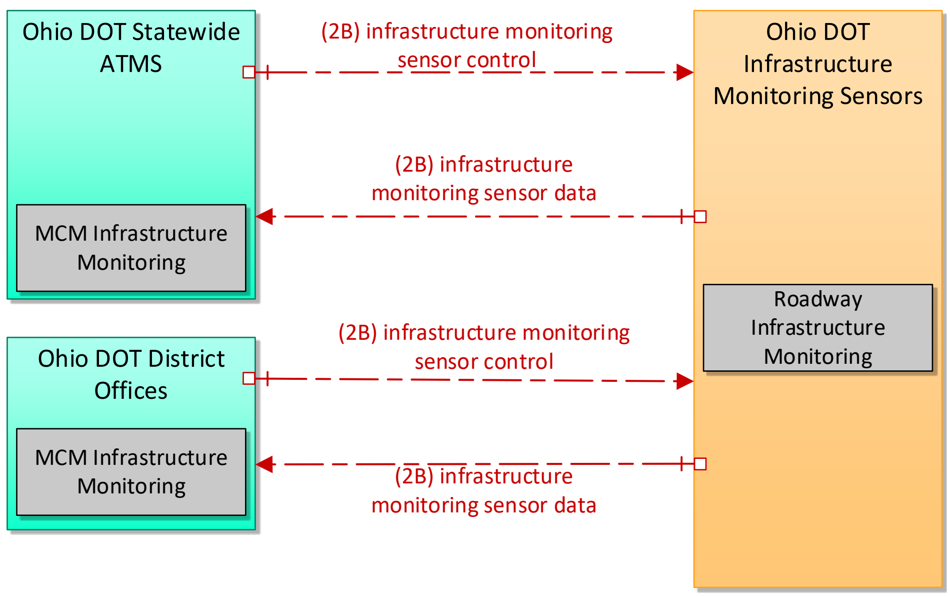


Figure 35 - MC06CV: Work Zone Management - CV (3)

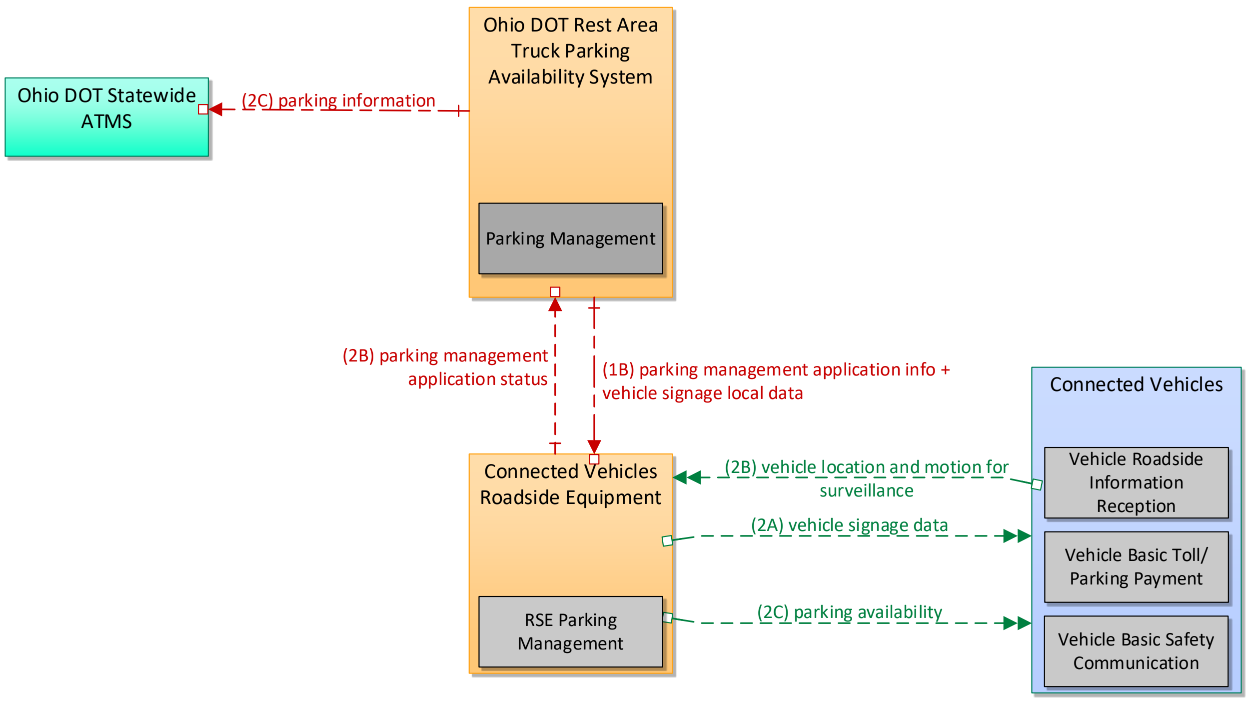
MC09: Infrastructure Monitoring (Block 3) - This service package monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts) using both fixed and vehicle-based infrastructure monitoring sensors. Fixed sensors monitor vibration, stress, temperature, continuity, and other parameters and mobile sensors and data logging devices collect information on current infrastructure condition. This service package also monitors vehicle probes for vertical acceleration data and other probe data that may be used to determine current pavement condition.



2: MC09: Infrastructure Monitoring (3)			
1	Based on ARC-IT Physical Diagram r2	Nov 04 2018	des

Figure 36 - MC09: Infrastructure Monitoring (3)

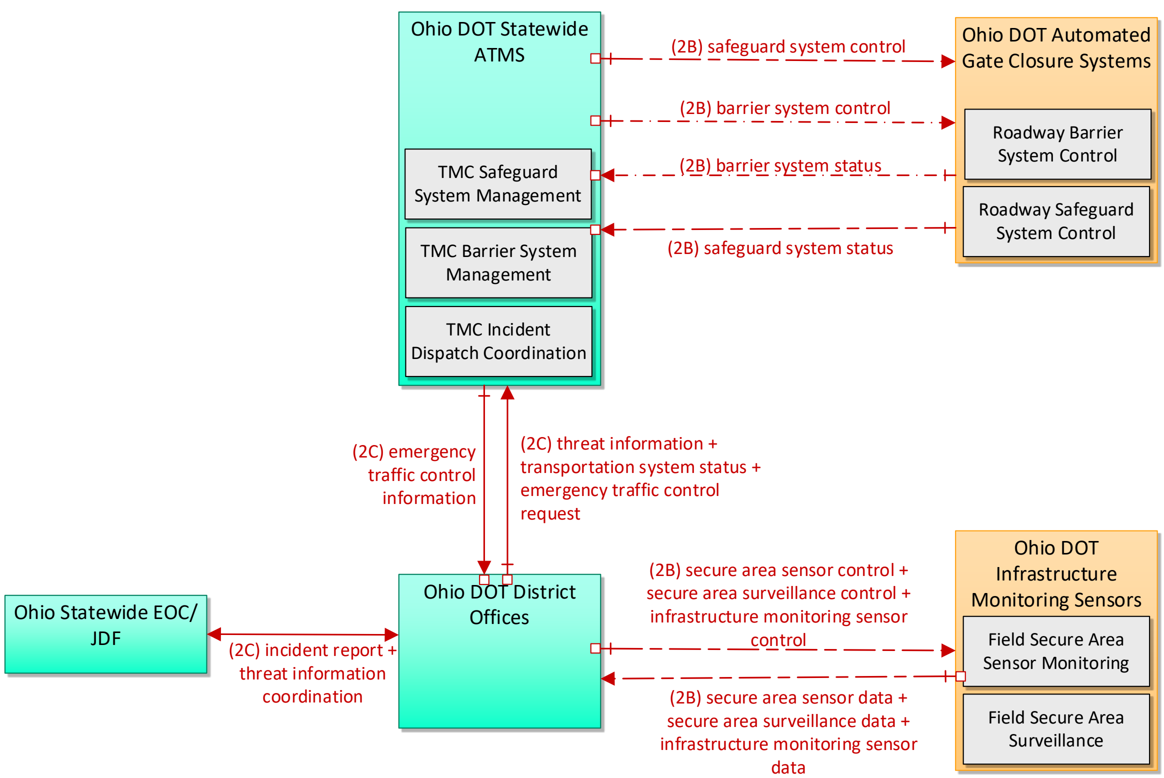
PM01CV: Parking Space Management - CV (Block 3) - This service package monitors and manages parking spaces in lots, garages, and other parking areas and facilities. It assists in the management of parking operations by monitoring parking lot ingress and egress, parking space occupancy and availability. Infrastructure-based detectors and/or connected vehicles may be used to monitor parking occupancy. The service package shares collected parking information with local drivers and information providers for broader distribution.



2: PM01CV: Parking Space Management - CV (3)			
1	Based on ARC-IT Physical Diagram r4	Nov 04 2018	des

Figure 37 - PM01CV: Parking Space Management - CV (3)

PS09: Transportation Infrastructure Protection (Block 3) - This service package includes the monitoring of transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats using sensors and surveillance equipment and barrier and safeguard systems to control access, preclude an incident, and mitigate the impact of an incident if it occurs. Threats can result from acts of nature (e.g., hurricanes, earthquakes), terrorist attacks or other incidents causing damage to the infrastructure (e.g., stray barge hitting a bridge support). Infrastructure may be monitored with acoustic, environmental threat (such as nuclear, biological, chemical, and explosives), infrastructure condition and integrity, motion and object sensors and video and audio surveillance equipment. Data from such sensors and surveillance equipment may be processed in the field or sent to a center for processing. The data enables operators at the center to detect and verify threats. When a threat is detected, agencies are notified. Detected threats or advisories received from other agencies result in an increased level of system preparedness. In response to threats, barrier and safeguard systems may be activated to deter an incident, control access to an area or mitigate the impact of an incident. Barrier systems include gates, barriers and other automated and remotely controlled systems that manage entry to transportation infrastructure. Safeguard systems include blast shields, exhaust systems and other automated and remotely controlled systems that mitigate impact of an incident.



2: PS09: Transportation Infrastructure Protection (3)			
1	Based on ARC-IT Physical Diagram r2	Nov 04 2018	des

Figure 38 - PS09: Transportation Infrastructure Protection (3)

SU03CV: Data Distribution – CV (Block 3) - This service package manages the distribution of data from data providers to data consumers and protects those data from unauthorized access. It informs data providers of how to provide data, manages data subscriptions, and provides data forwarding capabilities. The service package also maintains a directory of System Users that want data and supports multiple distribution mechanisms including publish-subscribe and directly from data provider to data consumer. It allows data consumers to specify (and change the specification of) data they wish to receive.

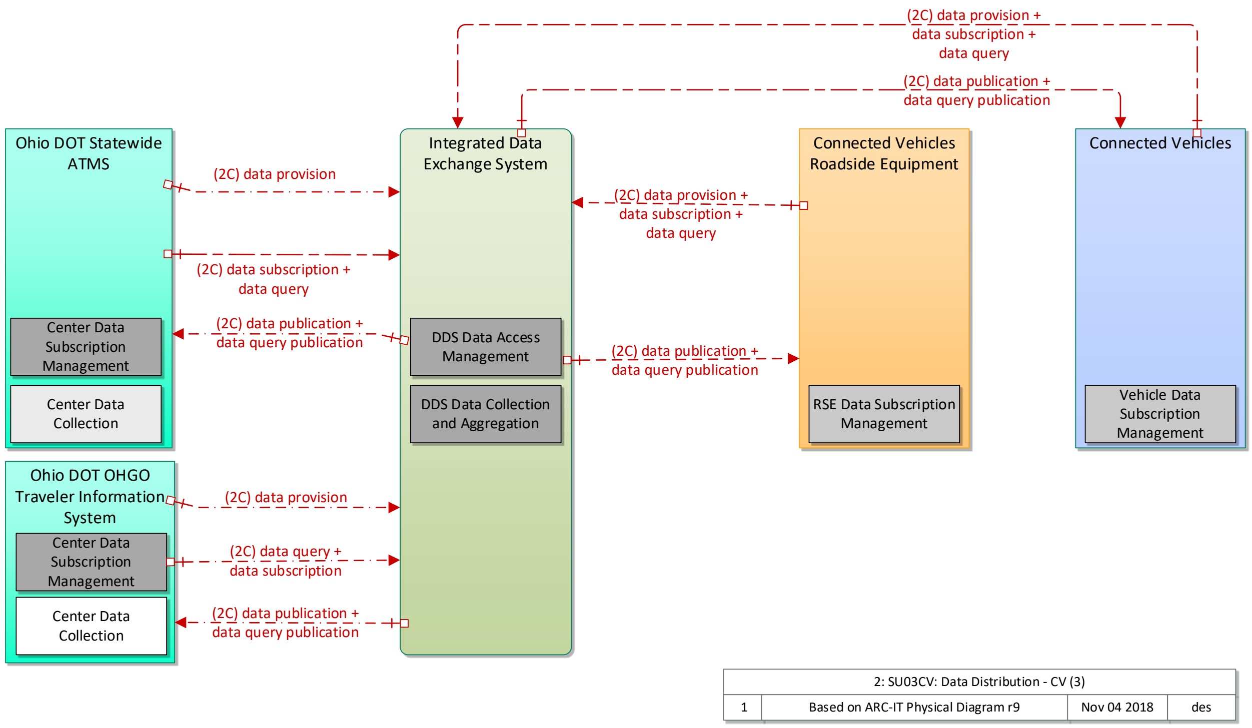
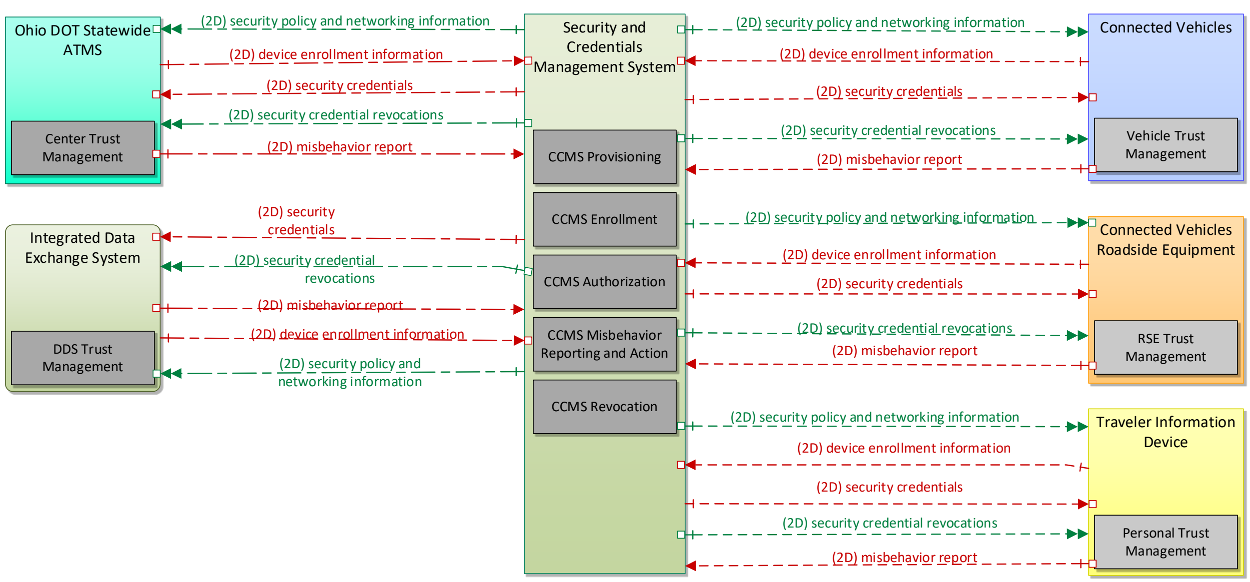


Figure 39 - SU03CV: Data Distribution - CV (3)

SU08CV: Security and Credentials Management – CV (Block 3) - This service package is used to ensure trusted communications between mobile devices and other mobile devices or roadside devices and protect data they handle from unauthorized access. The service package grants trust credentials to qualified mobile devices and infrastructure devices in the Connected Vehicle Environment so that those devices may be considered trusted by other devices that receive trust credentials from the SCM service package. The service package allows credentials to be requested and revoked and secures the exchange of trust credentials between parties, so that no other party can intercept and use those credentials illegitimately. The service package provides security to the transmissions between connected devices, ensuring authenticity and integrity of the transmissions. Additional security features include privacy protection, authorization and privilege class definition, as well as non-repudiation of origin.



2: SU08CV: Security and Credentials Management - CV (3)			
1	Based on ARC-IT Physical Diagram r5	Nov 04 2018	des

Figure 40 - SU08CV: Security and Credentials Management - CV (3)

TI01CV: Broadcast Traveler Information – CV (Block 3) - This service package provides a digital broadcast service that disseminates traveler information to all equipped travelers within range. It collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, air quality and weather information, and broadcasts the information to travelers using technologies such as FM subcarrier, satellite radio, cellular data broadcasts, and Internet streaming technologies.

This service package also provides location-specific or situation-relevant information to travelers in vehicles using Dedicated Short Range Communications (DSRC) infrastructure supporting mobility service packages for connected vehicles. DSRC is used to deliver real-time traveler information including travel times, incident information, road conditions, and emergency traveler information to vehicles as they pass connected vehicle roadside equipment along their route. This service package provides public information that is available to all equipped vehicles in the vicinity of the roadside equipment.

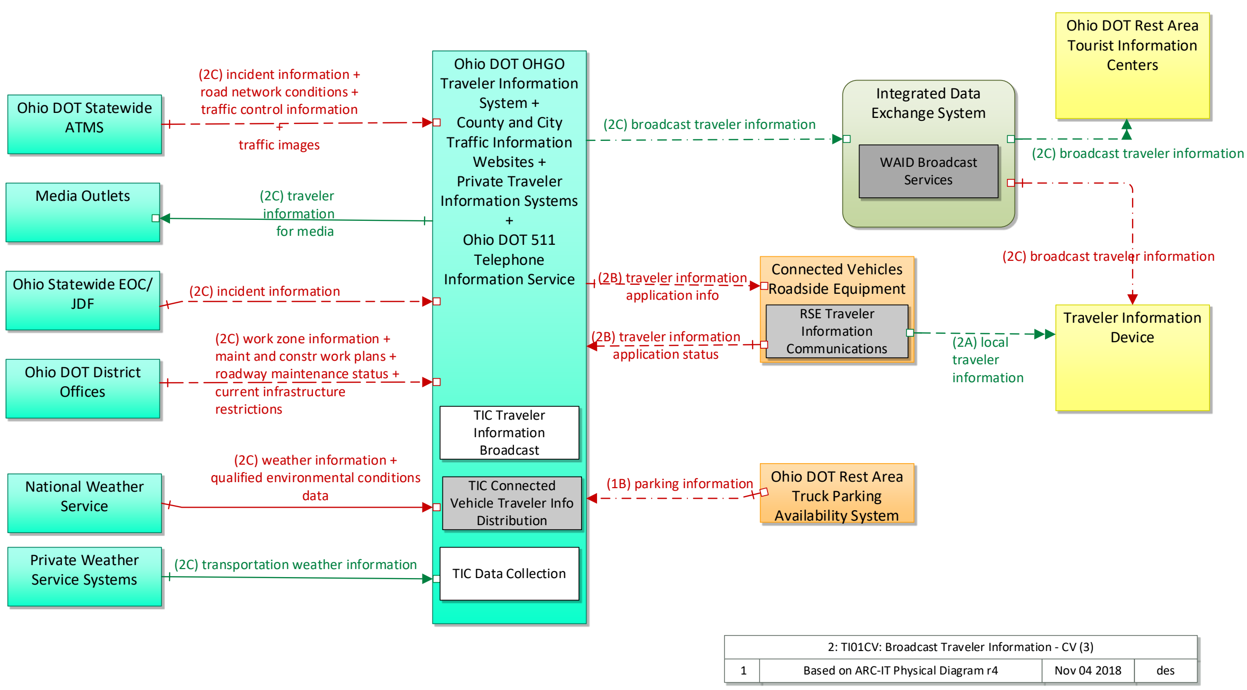
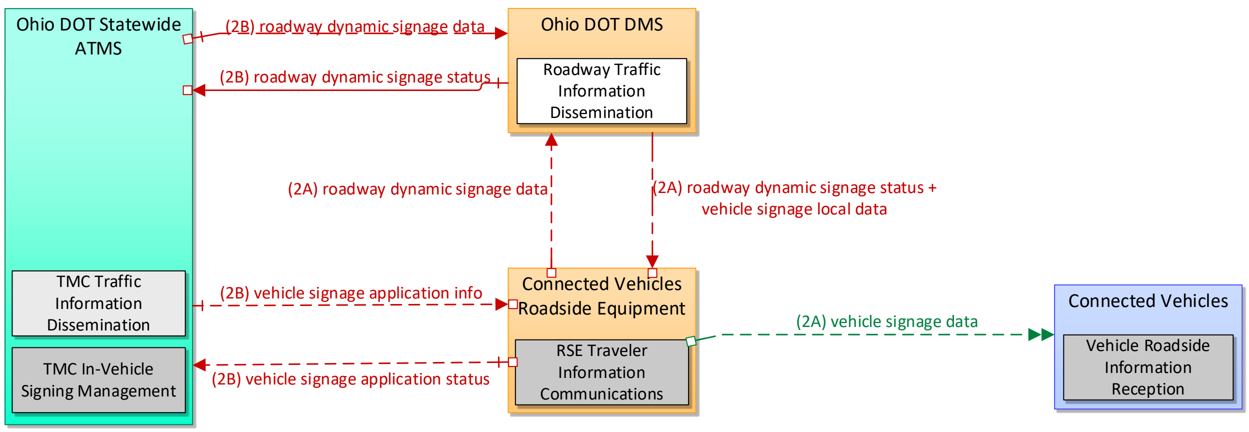


Figure 41 - TI01CV: Broadcast Traveler Information - CV (3)

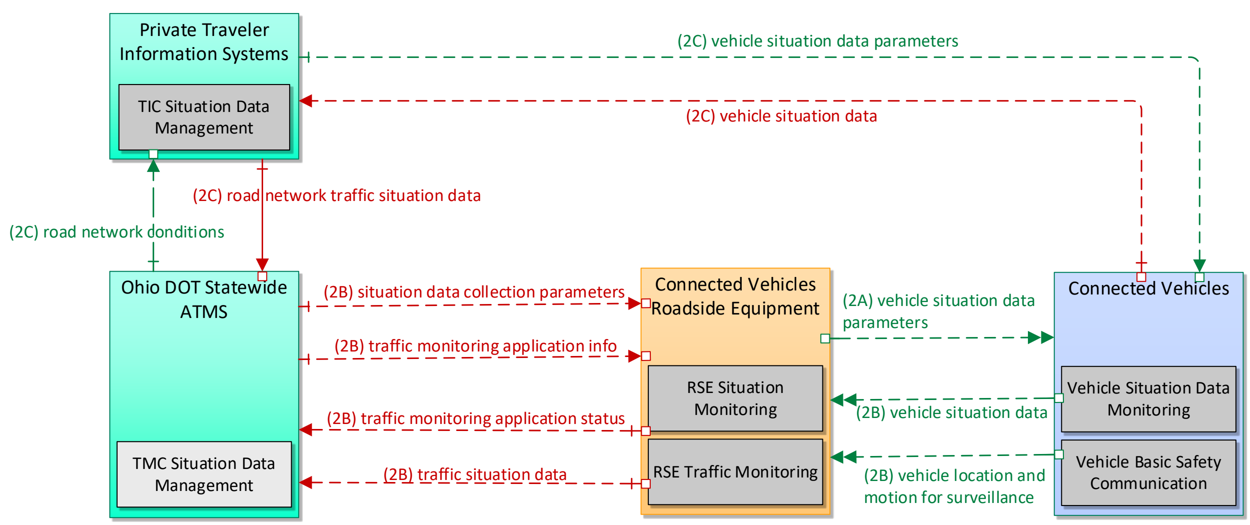
TI07: In-Vehicle Signage (Block 3) - This service package augments regulatory, warning, and informational signs and signals by providing information directly to drivers through in-vehicle devices. The information provided would include static sign information (e.g., stop, curve warning, guide signs, service signs, and directional signs) and dynamic information (e.g., current signal states including highway intersection and highway-rail intersection status and local conditions warnings identified by local environmental sensors). This service package also includes the capability for maintenance and construction, emergency, and transit vehicles to transmit sign information to vehicles in the vicinity so that in vehicle signing can be used without fixed infrastructure in areas such as work zones, around incidents, and at bus stops.



2: TI07: In-Vehicle Signage (3)			
1	Based on ARC-IT Physical Diagram r6	Nov 04 2018	des

Figure 42 - TI07: In-Vehicle Signage (3)

TM02CV: Vehicle-Based Traffic Surveillance – CV (Block 3) - This service package uses probe data information obtained from vehicles in the network to support traffic operations, including incident detection and the implementation of localized operational strategies. Since traffic data is collected from vehicles, travel times and other related traffic performance measures are available. This service package includes the capability to collect data from Connected Vehicles so that "probe" data can be collected from all equipped vehicles, providing access to a large vehicle population as penetration increases. Incident detection enables transportation agencies to determine the location of potential incidents so the agencies can respond more quickly to the incident and mitigate any negative impacts to the transportation network. Vehicle data that can be used to detect potential incidents include changes in vehicle speeds indicating the disruption of traffic flow, when a vehicle's safety systems have been activated or deployed, or sudden vehicle turns or deceleration at a specific location (indicating a potential obstacle in the roadway).



2: TM02CV: Vehicle-Based Traffic Surveillance - CV (3)			
1	Based on ARC-IT Physical Diagram r9	Nov 04 2018	des

Figure 43 - TM02CV: Vehicle-Based Traffic Surveillance - CV (3)

TM21: Speed Harmonization (Block 3) - This service package determines speed recommendations based on traffic conditions and weather information and uses connected vehicle technologies to assist in harmonizing speeds to these recommendations. The speed recommendations can be regulatory (e.g. variable speed limits) or advisory. The purpose of speed harmonization is to change traffic speed on links that approach areas of traffic congestion, bottlenecks, incidents, special events, and other conditions that affect flow. Speed harmonization assists in maintaining flow, reducing unnecessary stops and starts, and maintaining consistent speeds. The service package utilizes connected vehicle V2I communication to detect the precipitating roadway or congestion conditions that might necessitate speed harmonization, to generate the appropriate response plans and speed recommendation strategies for upstream traffic, and to broadcast such recommendations to the affected vehicles. The speed recommendations can be provided in-vehicle for connected vehicles, or through roadside signage for non-connected vehicles.

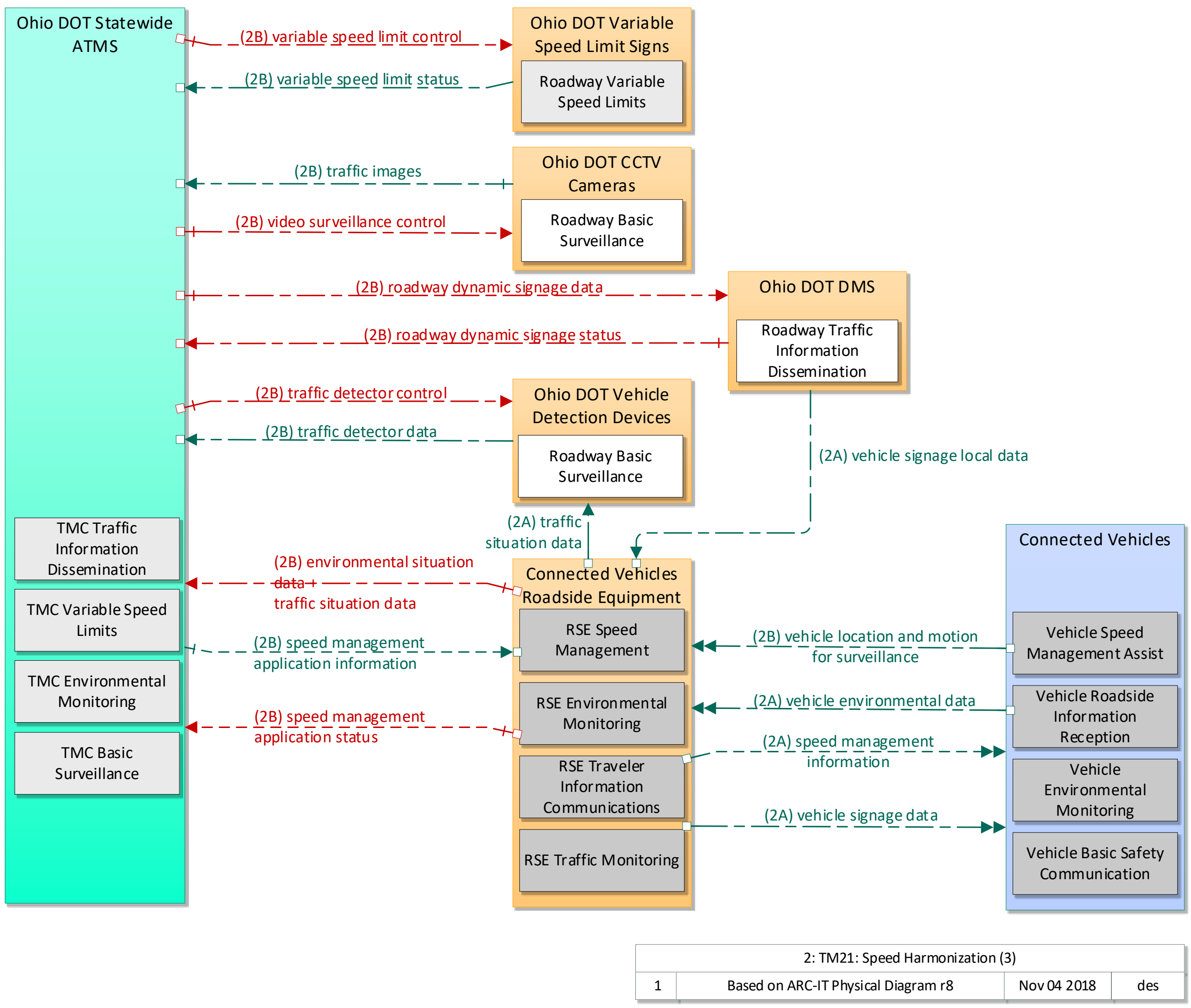


Figure 44 - TM21: Speed Harmonization (3)

TM22CV: Dynamic Lane Management and Shoulder Use – CV (Block 3) - This service package provides for active management of travel lanes along a roadway. The package includes the field equipment, physical overhead lane signs and associated control electronics that are used to manage and control specific lanes and/or the shoulders. This equipment can be used to change the lane configuration on the roadway according to traffic demand and lane destination along a typical roadway section or on approach to or access from a border crossing, multimodal crossing or intermodal freight depot. This package can be used to allow temporary or interim use of shoulders as travel lanes. The equipment can be used to electronically reconfigure intersections and interchanges and manage right-of-way dynamically including merges. Also, lanes can be designated for use by special vehicles only, such as buses, high occupancy vehicles (HOVs), vehicles attending a special event, etc. Prohibitions or restrictions of types of vehicles from using particular lanes can be implemented.

The lane management system can be centrally monitored and controlled by a traffic management center or it can be autonomous. This service also can include automated enforcement equipment that notifies the enforcement agency of violators of the lane controls.

Dynamic lane management and shoulder use is an Active Traffic Management (ATM) strategy and is typically used in conjunction with other ATM strategies (such as TM20-Variable Speed Limits).

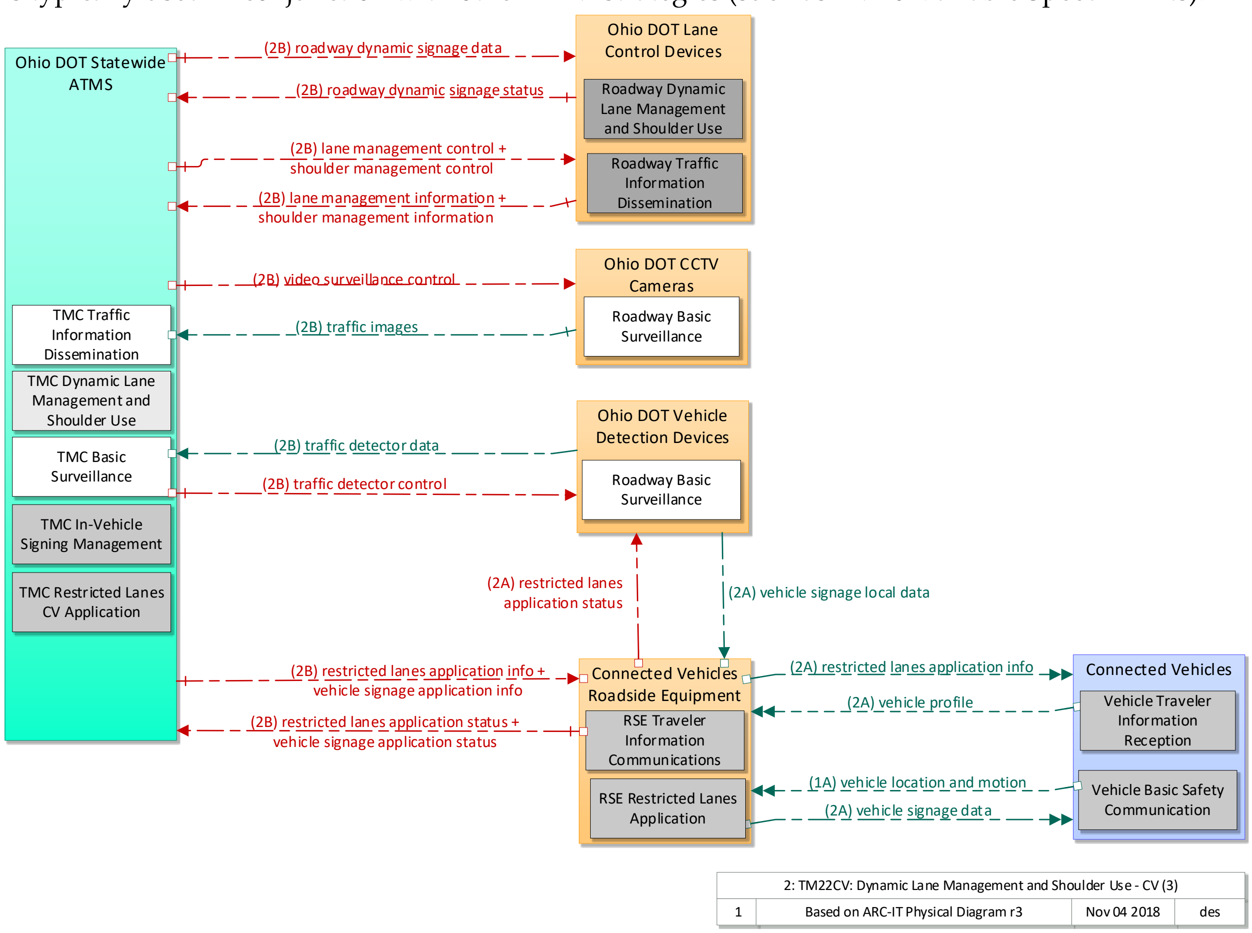


Figure 45 - TM22CV: Dynamic Lane Management and Shoulder Use - CV (3)

VS08CV: Queue Warning – CV (Block 3) - This service package utilizes connected vehicle technologies, including vehicle-to-infrastructure (V2I) and vehicle-to-vehicle (V2V) communications, to enable vehicles within the queue event to automatically broadcast their queued status information (e.g., rapid deceleration, disabled status, lane location) to nearby upstream vehicles and to centers (such as the TMC). The infrastructure will broadcast queue warnings to vehicles in order to minimize or prevent rear-end or other secondary collisions. This service package is not intended to operate as a crash avoidance system. In contrast to such systems, this service package will engage well in advance of any potential crash situation, providing messages and information to the driver in order to minimize the likelihood of his needing to take crash avoidance or mitigation actions later. It performs two essential tasks: queue determination (detection and/or prediction) and queue information dissemination using vehicle-based, infrastructure-based, or hybrid solutions.

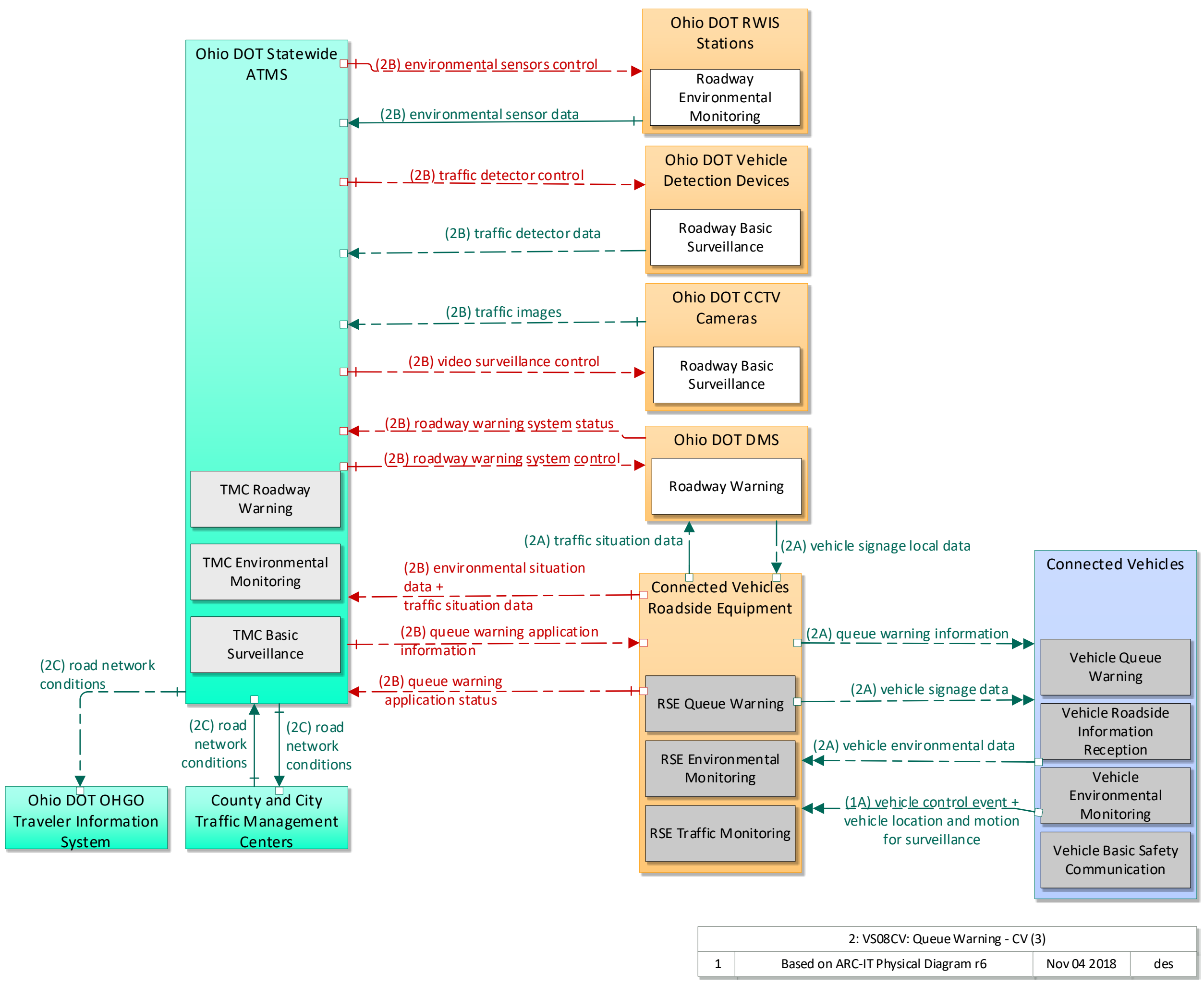


Figure 46 - VS08CV: Queue Warning - CV (3)

VS13: Intersection Safety Warning and Collision Avoidance (Block 3) - This service package enables a connected vehicle approaching an instrumented signalized intersection to receive information from the infrastructure regarding the signal timing and the geometry of the intersection. The vehicle uses its speed and acceleration profile, along with the signal timing and geometry information to determine if it appears likely that the vehicle will be able to pass safely through the intersection without violating the signal or colliding with other vehicles. If the vehicle determines that proceeding through the intersection is unsafe, a warning is provided to the driver and/or collision avoidance actions are taken, depending on the automation level of the vehicle.

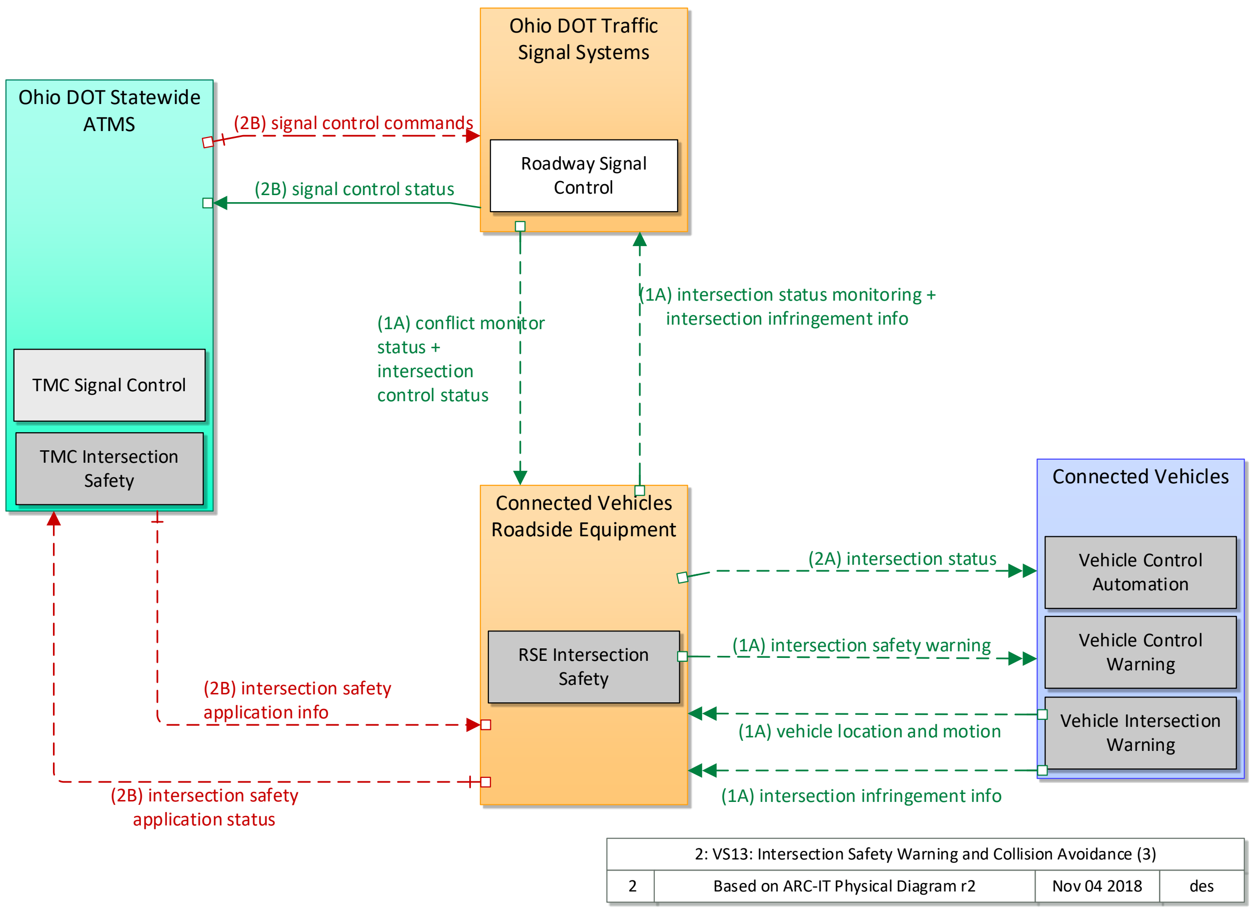


Figure 47 - VS13: Intersection Safety Warning and Collision Avoidance (3)

VS16: Automated Vehicle Operations (Block 3) - This service package provides full vehicle automation, controlling both the steering and acceleration/deceleration on areas of the highway system that support full automation. Communications between vehicles and between the vehicles and supporting infrastructure equipment supports cooperative check-in to the automated portion of the system and transition to automated mode, coordination of maneuvers between vehicles in automated mode, and checkout from the automated system. This service package is distinguished from the most advanced CACC systems in that full longitudinal and lateral control automation are supported, enabling closely spaced, tightly coupled platoons of vehicles to operate with short fixed gaps, providing greatly enhanced highway capacity and throughput with enhanced efficiency since aerodynamic drag is reduced.

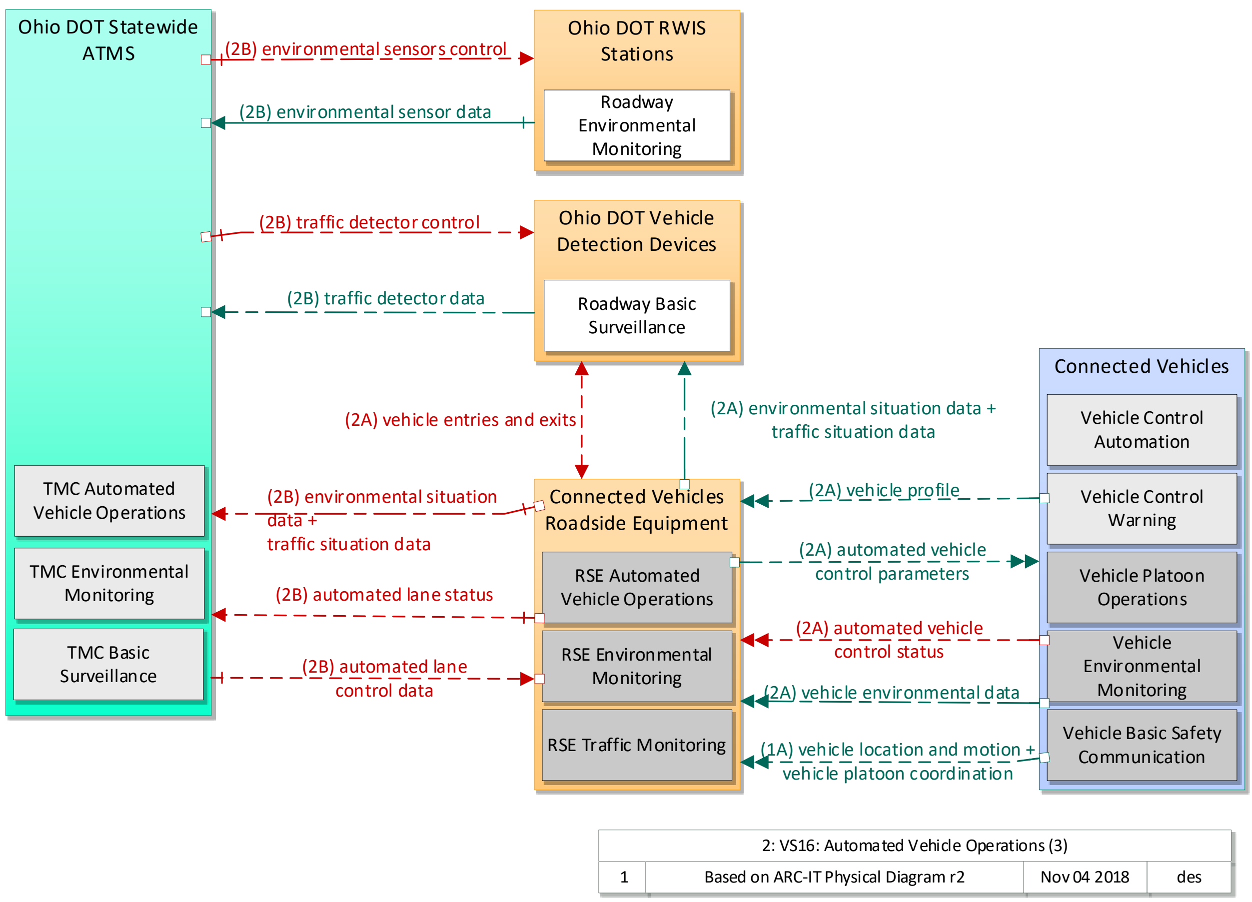
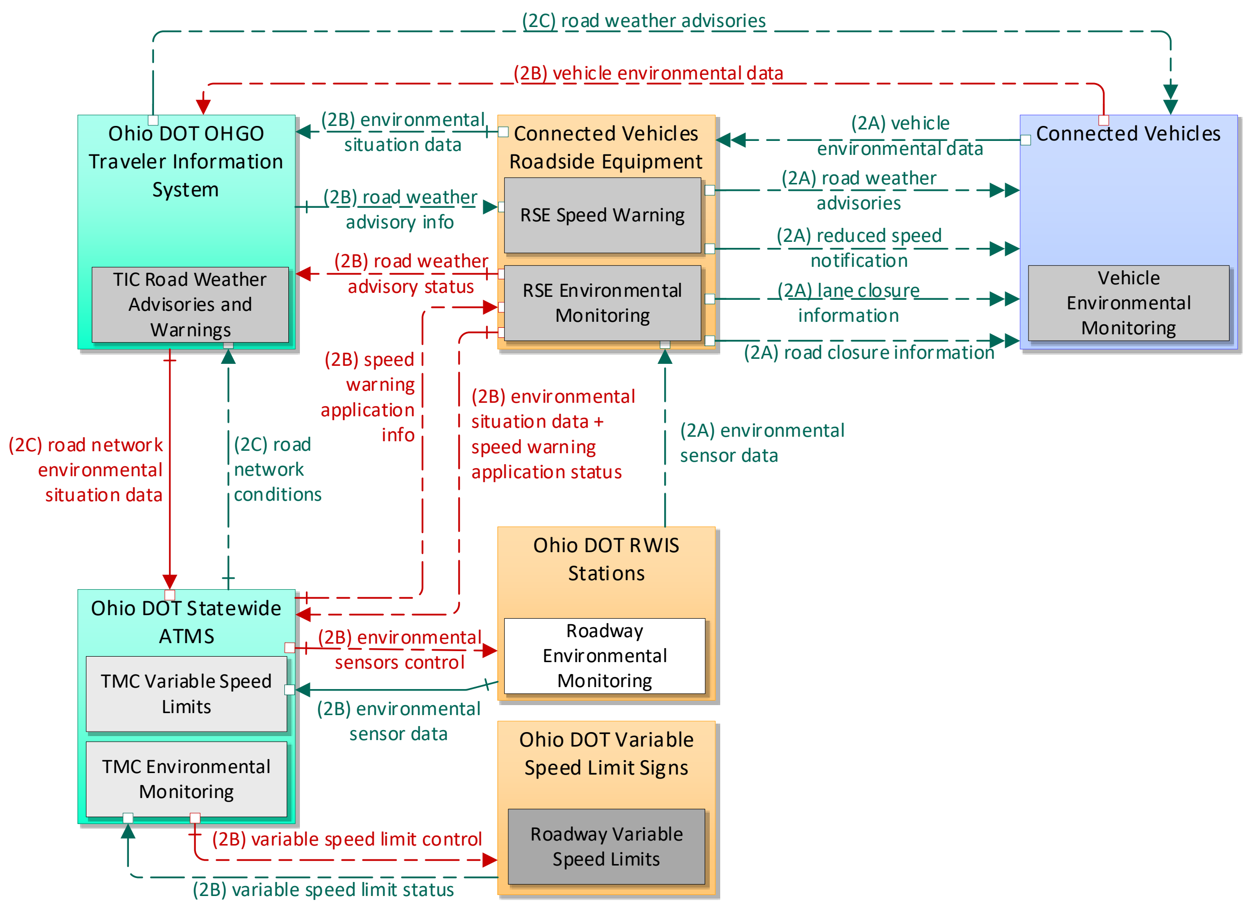


Figure 48 - VS16: Automated Vehicle Operations (3)

WX03CV: Spot Weather Impact Warning – CV (Block 3) - This service package will alert drivers to unsafe conditions or road closure at specific points on the downstream roadway as a result of weather-related impacts, which include, but are not limited to high winds, flood conditions, ice, or fog. The service packages is designed to use standalone weather systems to warn drivers about inclement weather conditions that may impact travel conditions. Real-time weather information is collected from fixed environmental sensor stations and vehicle-based sensors. The information is processed to determine the nature of the alert or warning to be delivered and then communicated to connected vehicles. If the warning includes road closure then diversion information can be provided. For non-equipped vehicles the alerts or warnings will be provided via roadway signage. In addition, the roadway equipment may calculate the appropriate speed for current weather conditions and provide this information to the connected vehicle or on roadway signage.



2: WX03CV: Spot Weather Impact Warning - CV (3)			
1	Based on ARC-IT Physical Diagram r6	Nov 04 2018	des

Figure 49 - WX03CV: Spot Weather Impact Warning - CV (3)

Appendix E – ATMS Interface Standards Profiles

The interface standards profiles listed in Table 3 are sorted by Information Flow and include the source and destination systems of which one is the ATMS. The interface standards profiles listed for each information flow are further detailed in the communications diagrams in Appendix F. The assignments of profile selections were guided by the following criteria:

- XML was selected for Center to Center interfaces involving an entity outside of the transportation field. XML is a broadly used standard that systems external to transportation use.
- NTCIP-DATEX was selected for Center to Center interfaces between transportation systems based on industry preferences.
- SNMP was selected for Center to Field interfaces for standardization of format.
- Vehicle tracking flows depending on the technology chosen. The standards profiles for these interfaces include four options: RSEGateway-VehicleSource, WAW-ASN1, WAW-WWWBrowser-JSON, or WAW-XML.
- For connected vehicle Center to Field interfaces, C2F-SNMP was selected.

Table 3 - ATMS Interface Standards Profiles

Information Flow	Source	Destination	Profile Recommendation
air quality information	Ohio EPA Air Quality Management System	Ohio DOT Statewide ATMS	XML
alert notification	County and City Law Enforcement	Ohio DOT Statewide ATMS	XML
alert notification	Ohio Statewide EOC/JDF	Ohio DOT Statewide ATMS	XML
alert status	Ohio DOT Statewide ATMS	County and City Law Enforcement	XML
alert status	Ohio DOT Statewide ATMS	Ohio Statewide EOC/JDF	XML
alerts and advisories	Ohio Emergency Alert System	Ohio DOT Statewide ATMS	XML
archive analysis requests	Ohio DOT Statewide ATMS	Ohio DPS Crash Database	XML
archive analysis results	Ohio DPS Crash Database	Ohio DOT Statewide ATMS	XML
archive request confirmation	Ohio DPS Crash Database	Ohio DOT Statewide ATMS	XML
archive requests	County and City Traffic Data Archives	Ohio DOT Statewide ATMS	XML
archive requests	MPOs Data Archives	Ohio DOT Statewide ATMS	XML
archive requests	Ohio DOT Traffic Data Archive System	Ohio DOT Statewide ATMS	NTCIP-DATEX

Information Flow	Source	Destination	Profile Recommendation
archive requests	Ohio DPS Crash Database	Ohio DOT Statewide ATMS	XML
archive requests	Ohio EPA Air Quality Database	Ohio DOT Statewide ATMS	XML
archive requests	Regional Transit Authorities Transit Data Archives	Ohio DOT Statewide ATMS	XML
archive status	County and City Traffic Data Archives	Ohio DOT Statewide ATMS	XML
archive status	MPOs Data Archives	Ohio DOT Statewide ATMS	XML
archive status	Ohio DOT Traffic Data Archive System	Ohio DOT Statewide ATMS	NTCIP-DATEX
archive status	Ohio DPS Crash Database	Ohio DOT Statewide ATMS	XML
archive status	Ohio EPA Air Quality Database	Ohio DOT Statewide ATMS	XML
archive status	Regional Transit Authorities Transit Data Archives	Ohio DOT Statewide ATMS	NTCIP
archived data product requests	Ohio DOT Statewide ATMS	Ohio DPS Crash Database	XML
archived data products	Ohio DPS Crash Database	Ohio DOT Statewide ATMS	XML
automated lane control data	Ohio DOT Statewide ATMS	Connected Vehicles Roadside Equipment	RSE C2F-SNMP
automated lane status	Connected Vehicles Roadside Equipment	Ohio DOT Statewide ATMS	RSE C2F-SNMP
barrier system control	Ohio DOT Statewide ATMS	Ohio DOT Automated Gate Closure Systems	NTCIP-SNMP
barrier system status	Ohio DOT Automated Gate Closure Systems	Ohio DOT Statewide ATMS	NTCIP-SNMP
center archive data	Ohio DOT Statewide ATMS	Ohio DOT Traffic Data Archive System	NTCIP-DATEX
current infrastructure restrictions	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
current infrastructure restrictions	Ohio DOT Statewide ATMS	OHPASS	NTCIP-DATEX
data provision	Ohio DOT Statewide ATMS	Integrated Data Exchange System	NTCIP-DATEX
data publication	Integrated Data Exchange System	Ohio DOT Statewide ATMS	NTCIP-DATEX
data query	Ohio DOT Statewide ATMS	Integrated Data Exchange System	NTCIP-DATEX

Information Flow	Source	Destination	Profile Recommendation
data query publication	Integrated Data Exchange System	Ohio DOT Statewide ATMS	NTCIP-DATEX
data subscription	Ohio DOT Statewide ATMS	Integrated Data Exchange System	NTCIP-DATEX
device control request	County and City Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
device control request	Neighboring State Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
device control request	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
device control request	Ohio DOT Statewide ATMS	County and City Traffic Management Centers	NTCIP-DATEX
device control request	Ohio DOT Statewide ATMS	Neighboring State Traffic Management Centers	NTCIP-DATEX
device control request	Ohio DOT Statewide ATMS	Ohio DOT District Offices	NTCIP-DATEX
device control request	Ohio DOT Statewide ATMS	Ohio Turnpike Central Dispatch	NTCIP-DATEX
device control request	Ohio Turnpike Central Dispatch	Ohio DOT Statewide ATMS	NTCIP-DATEX
device data	County and City Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
device data	Neighboring State Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
device data	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
device data	Ohio DOT Statewide ATMS	County and City Traffic Management Centers	NTCIP-DATEX
device data	Ohio DOT Statewide ATMS	Neighboring State Traffic Management Centers	NTCIP-DATEX
device data	Ohio DOT Statewide ATMS	Ohio DOT District Offices	NTCIP-DATEX
device data	Ohio DOT Statewide ATMS	Ohio Turnpike Central Dispatch	NTCIP-DATEX
device data	Ohio Turnpike Central Dispatch	Ohio DOT Statewide ATMS	NTCIP-DATEX
device enrollment information	Ohio DOT Statewide ATMS	Security and Credentials Management System	CCMS
device status	County and City Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
device status	Neighboring State Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
device status	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX

Information Flow	Source	Destination	Profile Recommendation
device status	Ohio DOT Statewide ATMS	County and City Traffic Management Centers	NTCIP-DATEX
device status	Ohio DOT Statewide ATMS	Neighboring State Traffic Management Centers	NTCIP-DATEX
device status	Ohio DOT Statewide ATMS	Ohio DOT District Offices	NTCIP-DATEX
device status	Ohio DOT Statewide ATMS	Ohio Turnpike Central Dispatch	NTCIP-DATEX
device status	Ohio Turnpike Central Dispatch	Ohio DOT Statewide ATMS	NTCIP-DATEX
emergency plan coordination	County and City Emergency Operations Centers (EOCs)	Ohio DOT Statewide ATMS	XML
emergency plan coordination	County and City Public Safety Dispatch	Ohio DOT Statewide ATMS	XML
emergency plan coordination	Ohio DOT Statewide ATMS	County and City Emergency Operations Centers (EOCs)	XML
emergency plan coordination	Ohio DOT Statewide ATMS	County and City Public Safety Dispatch	XML
emergency plan coordination	Ohio DOT Statewide ATMS	Ohio State Highway Patrol Posts	XML
emergency plan coordination	Ohio DOT Statewide ATMS	Ohio Statewide EOC/JDF	XML
emergency plan coordination	Ohio State Highway Patrol Posts	Ohio DOT Statewide ATMS	XML
emergency plan coordination	Ohio Statewide EOC/JDF	Ohio DOT Statewide ATMS	XML
emergency route request	County and City Public Safety Dispatch	Ohio DOT Statewide ATMS	XML
emergency route request	Ohio State Highway Patrol State Communications Center	Ohio DOT Statewide ATMS	XML
emergency routes	Ohio DOT Statewide ATMS	County and City Public Safety Dispatch	XML
emergency routes	Ohio DOT Statewide ATMS	Ohio State Highway Patrol State Communications Center	XML
emergency traffic control information	Ohio DOT Statewide ATMS	County and City Emergency Operations Centers (EOCs)	XML
emergency traffic control information	Ohio DOT Statewide ATMS	County and City Public Safety Dispatch	XML
emergency traffic control information	Ohio DOT Statewide ATMS	Ohio DOT District Offices	NTCIP-DATEX
emergency traffic control information	Ohio DOT Statewide ATMS	Ohio State Highway Patrol Posts	XML

Information Flow	Source	Destination	Profile Recommendation
emergency traffic control information	Ohio DOT Statewide ATMS	Ohio State Highway Patrol State Communications Center	XML
emergency traffic control information	Ohio DOT Statewide ATMS	Ohio Statewide EOC/JDF	XML
emergency traffic control request	County and City Emergency Operations Centers (EOCs)	Ohio DOT Statewide ATMS	XML
emergency traffic control request	County and City Public Safety Dispatch	Ohio DOT Statewide ATMS	XML
emergency traffic control request	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
emergency traffic control request	Ohio State Highway Patrol Posts	Ohio DOT Statewide ATMS	XML
emergency traffic control request	Ohio State Highway Patrol State Communications Center	Ohio DOT Statewide ATMS	XML
emergency traffic control request	Ohio Statewide EOC/JDF	Ohio DOT Statewide ATMS	XML
emergency traffic coordination	County and City Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
emergency traffic coordination	Neighboring State Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
emergency traffic coordination	Ohio DOT Statewide ATMS	County and City Traffic Management Centers	NTCIP-DATEX
emergency traffic coordination	Ohio DOT Statewide ATMS	Neighboring State Traffic Management Centers	NTCIP-DATEX
emergency traffic coordination	Ohio DOT Statewide ATMS	Ohio DOT Traffic Signal Systems	NTCIP-DATEX
emergency traffic coordination	Ohio DOT Traffic Signal Systems	Ohio DOT Statewide ATMS	NTCIP-DATEX
emergency vehicle tracking data	Ohio DOT Safety Patrol Vehicles	Ohio DOT Statewide ATMS	RSEGateway-VehicleSource or WAW-ASN1 or WAW-WWWBrowser-JSON or WAW-XML
environmental conditions data	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
environmental conditions data	Ohio DOT Statewide ATMS	National Weather Service	XML
environmental conditions data	Ohio DOT Statewide ATMS	Ohio DOT District Offices	NTCIP-DATEX
environmental conditions data	Ohio DOT Statewide ATMS	Private Weather Service Systems	XML

Information Flow	Source	Destination	Profile Recommendation
environmental conditions data status	National Weather Service	Ohio DOT Statewide ATMS	XML
environmental conditions data status	Private Weather Service Systems	Ohio DOT Statewide ATMS	XML
environmental sensor data	Ohio DOT RWIS Stations	Ohio DOT Statewide ATMS	NTCIP-SNMP
environmental sensor data	Ohio DOT Speed Monitoring Roadside Equipment	Ohio DOT Statewide ATMS	NTCIP-SNMP
environmental sensors control	Ohio DOT Statewide ATMS	Ohio DOT RWIS Stations	NTCIP-SNMP
environmental sensors control	Ohio DOT Statewide ATMS	Ohio DOT Speed Monitoring Roadside Equipment	NTCIP-SNMP
environmental situation data	Connected Vehicles Roadside Equipment	Ohio DOT Statewide ATMS	RSE-C2F-SNMP
equipment maintenance request	Ohio DOT Statewide ATMS	Ohio DOT District Offices	NTCIP-DATEX
equipment maintenance status	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
evacuation information	County and City Emergency Operations Centers (EOCs)	Ohio DOT Statewide ATMS	XML
evacuation information	County and City Public Safety Dispatch	Ohio DOT Statewide ATMS	XML
evacuation information	Ohio Statewide EOC/JDF	Ohio DOT Statewide ATMS	XML
event confirmation	Ohio DOT Statewide ATMS	Regional Event Operations	XML
event plans	Regional Event Operations	Ohio DOT Statewide ATMS	XML
external reports	Media Outlets	Ohio DOT Statewide ATMS	XML
fare and price information	Ohio DOT OHGO Traveler Information System	Ohio DOT Statewide ATMS	NTCIP-DATEX
incident information	County and City Emergency Operations Centers (EOCs)	Ohio DOT Statewide ATMS	XML
incident information	County and City Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
incident information	Neighboring State Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
incident information	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX

Information Flow	Source	Destination	Profile Recommendation
incident information	Ohio DOT Statewide ATMS	County and City Emergency Operations Centers (EOCs)	XML
incident information	Ohio DOT Statewide ATMS	County and City Traffic Management Centers	NTCIP-DATEX
incident information	Ohio DOT Statewide ATMS	Neighboring State Traffic Management Centers	NTCIP-DATEX
incident information	Ohio DOT Statewide ATMS	Ohio DOT District Offices	NTCIP-DATEX
incident information	Ohio DOT Statewide ATMS	Ohio DOT OHGO Traveler Information System	NTCIP-DATEX
incident information	Ohio DOT Statewide ATMS	Ohio State Highway Patrol Posts	XML
incident information	Ohio DOT Statewide ATMS	Ohio State Highway Patrol State Communications Center	XML
incident information	Ohio DOT Statewide ATMS	Ohio Statewide EOC/JDF	XML
incident information	Ohio DOT Statewide ATMS	Ohio Turnpike Central Dispatch	NTCIP-DATEX
incident information	Ohio State Highway Patrol Posts	Ohio DOT Statewide ATMS	XML
incident information	Ohio State Highway Patrol State Communications Center	Ohio DOT Statewide ATMS	XML
incident information	Ohio Statewide EOC/JDF	Ohio DOT Statewide ATMS	XML
incident information	Ohio Turnpike Central Dispatch	Ohio DOT Statewide ATMS	NTCIP-DATEX
incident response status	Ohio DOT Statewide ATMS	Ohio State Highway Patrol State Communications Center	XML
incident response status	Ohio State Highway Patrol Posts	Ohio DOT Statewide ATMS	XML
incident response status	Ohio State Highway Patrol State Communications Center	Ohio DOT Statewide ATMS	XML
incident response status	Ohio Statewide EOC/JDF	Ohio DOT Statewide ATMS	XML
infrastructure monitoring sensor control	Ohio DOT Statewide ATMS	Ohio DOT Infrastructure Monitoring Sensors	NTCIP-SNMP
infrastructure monitoring sensor data	Ohio DOT Infrastructure Monitoring Sensors	Ohio DOT Statewide ATMS	NTCIP-SNMP

Information Flow	Source	Destination	Profile Recommendation
intersection safety application info	Ohio DOT Statewide ATMS	Connected Vehicles Roadside Equipment	RSE-C2F-SNMP
intersection safety application status	Connected Vehicles Roadside Equipment	Ohio DOT Statewide ATMS	RSE-C2F-SNMP
lane management control	Ohio DOT Statewide ATMS	Ohio DOT Lane Control Devices	NTCIP-SNMP
lane management information	Ohio DOT Lane Control Devices	Ohio DOT Statewide ATMS	NTCIP-SNMP
logged vehicle routes	Ohio DOT OHGO Traveler Information System	Ohio DOT Statewide ATMS	NTCIP-DATEX
maint and constr resource request	Ohio DOT Statewide ATMS	County and City Maintenance Dispatch Facilities	XML
maint and constr resource request	Ohio DOT Statewide ATMS	Ohio DOT District Offices	NTCIP-DATEX
maint and constr resource response	County and City Maintenance Dispatch Facilities	Ohio DOT Statewide ATMS	XML
maint and constr resource response	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
maint and constr work plans	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
misbehavior report	Ohio DOT Statewide ATMS	Security and Credentials Management System	CCMS
Oversize/Overweight Permits	OHPASS	Ohio DOT Statewide ATMS	NTCIP-DATEX
parking information	Ohio DOT Rest Area Truck Parking Availability System	Ohio DOT Statewide ATMS	NTCIP-DATEX
qualified environmental conditions data	National Weather Service	Ohio DOT Statewide ATMS	XML
qualified environmental conditions data	Private Weather Service Systems	Ohio DOT Statewide ATMS	XML
queue warning application information	Ohio DOT Statewide ATMS	Connected Vehicles Roadside Equipment	RSE-C2F-SNMP
queue warning application status	Connected Vehicles Roadside Equipment	Ohio DOT Statewide ATMS	RSE-C2F-SNMP
remote surveillance control	Ohio State Highway Patrol State Communications Center	Ohio DOT Statewide ATMS	XML
resource deployment status	Ohio DOT Statewide ATMS	Ohio State Highway Patrol Posts	XML

Information Flow	Source	Destination	Profile Recommendation
resource deployment status	Ohio DOT Statewide ATMS	Ohio State Highway Patrol State Communications Center	XML
resource deployment status	Ohio DOT Statewide ATMS	Ohio Statewide EOC/JDF	XML
resource deployment status	Ohio State Highway Patrol State Communications Center	Ohio DOT Statewide ATMS	XML
resource request	Ohio DOT Statewide ATMS	Ohio State Highway Patrol State Communications Center	XML
resource request	Ohio State Highway Patrol Posts	Ohio DOT Statewide ATMS	XML
resource request	Ohio State Highway Patrol State Communications Center	Ohio DOT Statewide ATMS	XML
resource request	Ohio Statewide EOC/JDF	Ohio DOT Statewide ATMS	XML
restricted lanes application info	Ohio DOT Statewide ATMS	Connected Vehicles Roadside Equipment	RSE-C2F-SNMP
restricted lanes application status	Connected Vehicles Roadside Equipment	Ohio DOT Statewide ATMS	RSE-C2F-SNMP
road closure notification	Ohio State Highway Patrol State Communications Center	Ohio DOT Statewide ATMS	XML
road network conditions	County and City Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
road network conditions	Neighboring State Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
road network conditions	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
road network conditions	Ohio DOT Statewide ATMS	County and City Emergency Operations Centers (EOCs)	XML
road network conditions	Ohio DOT Statewide ATMS	County and City Public Safety Dispatch	XML
road network conditions	Ohio DOT Statewide ATMS	County and City Traffic Information Websites	NTCIP-DATEX
road network conditions	Ohio DOT Statewide ATMS	County and City Traffic Management Centers	NTCIP-DATEX
road network conditions	Ohio DOT Statewide ATMS	Neighboring State Traffic Management Centers	NTCIP-DATEX
road network conditions	Ohio DOT Statewide ATMS	Ohio DOT 511 Telephone Information Service	NTCIP-DATEX

Information Flow	Source	Destination	Profile Recommendation
road network conditions	Ohio DOT Statewide ATMS	Ohio DOT District Offices	NTCIP-DATEX
road network conditions	Ohio DOT Statewide ATMS	Ohio DOT OHGO Traveler Information System	NTCIP-DATEX
road network conditions	Ohio DOT Statewide ATMS	Ohio DOT Traffic Signal Systems	NTCIP-DATEX
road network conditions	Ohio DOT Statewide ATMS	Ohio State Highway Patrol Posts	XML
road network conditions	Ohio DOT Statewide ATMS	Ohio State Highway Patrol State Communications Center	XML
road network conditions	Ohio DOT Statewide ATMS	Ohio Statewide EOC/JDF	XML
road network conditions	Ohio DOT Statewide ATMS	Ohio Turnpike Central Dispatch	NTCIP-DATEX
road network conditions	Ohio DOT Statewide ATMS	Private Fleet and Freight Operations	XML
road network conditions	Ohio DOT Statewide ATMS	Private Traveler Information Systems	NTCIP-DATEX
road network conditions	Ohio DOT Traffic Signal Systems	Ohio DOT Statewide ATMS	NTCIP-DATEX
road network conditions	Ohio Turnpike Central Dispatch	Ohio DOT Statewide ATMS	NTCIP-DATEX
road network environmental situation data	Ohio DOT OHGO Traveler Information System	Ohio DOT Statewide ATMS	NTCIP-DATEX
road network status assessment	County and City Maintenance Dispatch Facilities	Ohio DOT Statewide ATMS	XML
road network status assessment	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
road network status assessment	Ohio DOT Statewide ATMS	County and City Maintenance Dispatch Facilities	XML
road network status assessment	Ohio DOT Statewide ATMS	Ohio DOT District Offices	NTCIP-DATEX
road network status assessment	Ohio DOT Statewide ATMS	Ohio State Highway Patrol Posts	XML
road network status assessment	Ohio DOT Statewide ATMS	Ohio Statewide EOC/JDF	XML
road network traffic situation data	Private Traveler Information Systems	Ohio DOT Statewide ATMS	XML
road weather information	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX

Information Flow	Source	Destination	Profile Recommendation
roadway advisory radio data	Ohio DOT Statewide ATMS	Ohio DOT HAR	NTCIP-SNMP
roadway advisory radio status	Ohio DOT HAR	Ohio DOT Statewide ATMS	NTCIP-SNMP
roadway dynamic signage data	Ohio DOT Statewide ATMS	Ohio DOT DMS	NTCIP-SNMP
roadway dynamic signage data	Ohio DOT Statewide ATMS	Ohio DOT Variable Speed Limit Signs	NTCIP-SNMP
roadway dynamic signage status	Ohio DOT DMS	Ohio DOT Statewide ATMS	NTCIP-SNMP
roadway dynamic signage status	Ohio DOT Variable Speed Limit Signs	Ohio DOT Statewide ATMS	NTCIP-SNMP
roadway maintenance status	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
roadway warning system control	Ohio DOT Statewide ATMS	Ohio DOT DMS	NTCIP-SNMP
roadway warning system status	Ohio DOT DMS	Ohio DOT Statewide ATMS	NTCIP-SNMP
safeguard system control	Ohio DOT Statewide ATMS	Ohio DOT Automated Gate Closure Systems	NTCIP-SNMP
safeguard system status	Ohio DOT Automated Gate Closure Systems	Ohio DOT Statewide ATMS	NTCIP-SNMP
security credential revocations	Security and Credentials Management System	Ohio DOT Statewide ATMS	CCMS
security credentials	Security and Credentials Management System	Ohio DOT Statewide ATMS	CCMS
security policy and networking information	Security and Credentials Management System	Ohio DOT Statewide ATMS	CCMS
service patrol dispatch request	Ohio DOT Statewide ATMS	Ohio DOT Safety Patrol Vehicles	RSEGateway-VehicleSource or WAW-ASN1 or WAW-WWWBrowser-JSON or WAW-XML
service patrol dispatch response	Ohio DOT Safety Patrol Vehicles	Ohio DOT Statewide ATMS	RSEGateway-VehicleSource or WAW-ASN1 or WAW-WWWBrowser-JSON or WAW-XML

Information Flow	Source	Destination	Profile Recommendation
service patrol incident status	Ohio DOT Safety Patrol Vehicles	Ohio DOT Statewide ATMS	RSEGateway-VehicleSource or WAW-ASN1 or WAW-WWWBrowser-JSON or WAW-XML
shoulder management control	Ohio DOT Statewide ATMS	Ohio DOT Lane Control Devices	NTCIP-SNMP
shoulder management information	Ohio DOT Lane Control Devices	Ohio DOT Statewide ATMS	NTCIP-SNMP
signal control commands	Ohio DOT Statewide ATMS	Ohio DOT Traffic Signal Systems	NTCIP-SNMP
signal control status	Ohio DOT Traffic Signal Systems	Ohio DOT Statewide ATMS	NTCIP-SNMP
situation data collection parameters	Ohio DOT Statewide ATMS	Connected Vehicles Roadside Equipment	RSE-C2F-SNMP
speed management application information	Ohio DOT Statewide ATMS	Connected Vehicles Roadside Equipment	RSE-C2F-SNMP
speed management application status	Connected Vehicles Roadside Equipment	Ohio DOT Statewide ATMS	RSE-C2F-SNMP
speed warning application info	Ohio DOT Statewide ATMS	Connected Vehicles Roadside Equipment	RSE-C2F-SNMP
speed warning application status	Connected Vehicles Roadside Equipment	Ohio DOT Statewide ATMS	RSE-C2F-SNMP
threat information	County and City Emergency Operations Centers (EOCs)	Ohio DOT Statewide ATMS	XML
threat information	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
threat information	Ohio State Highway Patrol Posts	Ohio DOT Statewide ATMS	XML
threat information	Ohio State Highway Patrol State Communications Center	Ohio DOT Statewide ATMS	XML
threat information	Ohio Statewide EOC/JDF	Ohio DOT Statewide ATMS	XML
toll data	Ohio Turnpike Central Dispatch	Ohio DOT Statewide ATMS	NTCIP-DATEX
traffic archive data	Ohio DOT Statewide ATMS	County and City Traffic Data Archives	XML
traffic archive data	Ohio DOT Statewide ATMS	MPOs Data Archives	XML

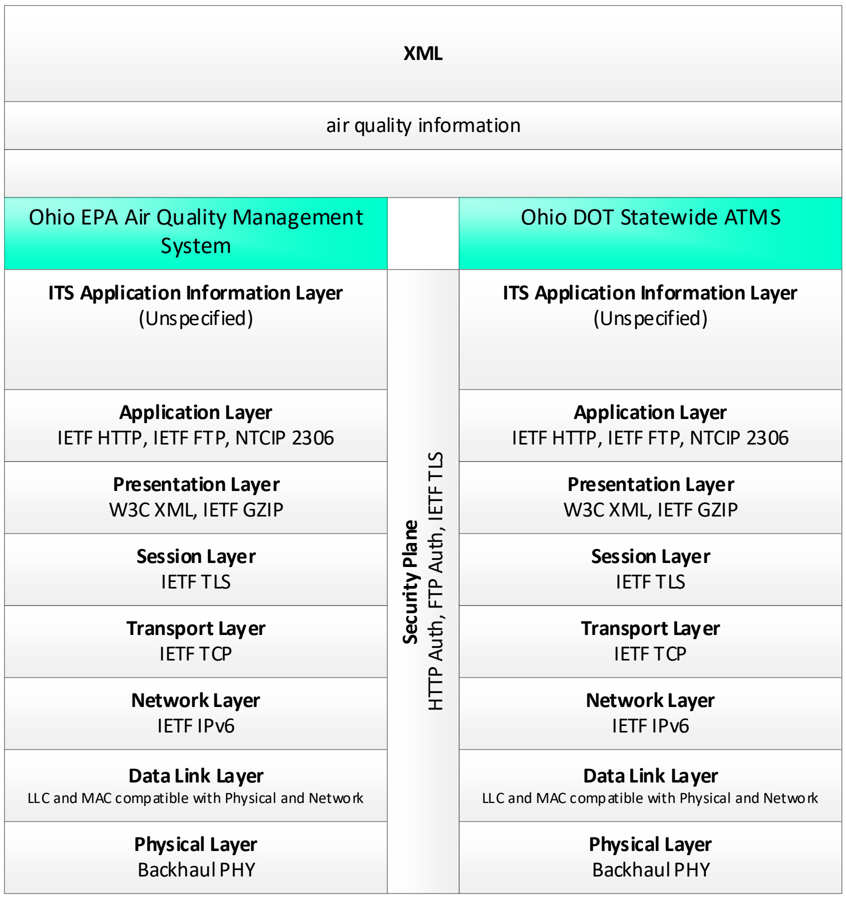
Information Flow	Source	Destination	Profile Recommendation
traffic archive data	Ohio DOT Statewide ATMS	Ohio DOT Traffic Data Archive System	NTCIP-DATEX
traffic archive data	Ohio DOT Statewide ATMS	Ohio DPS Crash Database	XML
traffic archive data	Ohio DOT Statewide ATMS	Ohio EPA Air Quality Database	XML
traffic archive data	Ohio DOT Statewide ATMS	Regional Transit Authorities Transit Data Archives	XML
traffic control information	Ohio DOT Statewide ATMS	County and City Traffic Information Websites	NTCIP-DATEX
traffic control information	Ohio DOT Statewide ATMS	Ohio DOT 511 Telephone Information Service	NTCIP-DATEX
traffic control information	Ohio DOT Statewide ATMS	Ohio DOT OHGO Traveler Information System	NTCIP-DATEX
traffic control information	Ohio DOT Statewide ATMS	Private Traveler Information Systems	NTCIP-DATEX
traffic detector control	Ohio DOT Statewide ATMS	Ohio DOT Vehicle Detection Devices	NTCIP-SNMP
traffic detector data	Ohio DOT Vehicle Detection Devices	Ohio DOT Statewide ATMS	NTCIP-SNMP
traffic images	County and City Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
traffic images	Neighboring State Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
traffic images	Ohio DOT CCTV Cameras	Ohio DOT Statewide ATMS	NTCIP-SNMP
traffic images	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
traffic images	Ohio DOT Statewide ATMS	County and City Traffic Information Websites	NTCIP-DATEX
traffic images	Ohio DOT Statewide ATMS	County and City Traffic Management Centers	NTCIP-DATEX
traffic images	Ohio DOT Statewide ATMS	Media Outlets	XML
traffic images	Ohio DOT Statewide ATMS	Neighboring State Traffic Management Centers	NTCIP-DATEX
traffic images	Ohio DOT Statewide ATMS	Ohio DOT 511 Telephone Information Service	NTCIP-DATEX
traffic images	Ohio DOT Statewide ATMS	Ohio DOT District Offices	NTCIP-DATEX
traffic images	Ohio DOT Statewide ATMS	Ohio DOT OHGO Traveler Information System	NTCIP-DATEX
traffic images	Ohio DOT Statewide ATMS	Ohio State Highway Patrol State Communications Center	XML

Information Flow	Source	Destination	Profile Recommendation
traffic images	Ohio DOT Statewide ATMS	Ohio Turnpike Central Dispatch	NTCIP-DATEX
traffic images	Ohio DOT Statewide ATMS	Private Traveler Information Systems	NTCIP-DATEX
traffic images	Ohio Turnpike Central Dispatch	Ohio DOT Statewide ATMS	NTCIP-DATEX
traffic information for media	Ohio DOT Statewide ATMS	Media Outlets	XML
traffic metering control	Ohio DOT Statewide ATMS	Ohio DOT Ramp Meters	NTCIP-SNMP
traffic metering status	Ohio DOT Ramp Meters	Ohio DOT Statewide ATMS	NTCIP-SNMP
traffic monitoring application info	Ohio DOT Statewide ATMS	Connected Vehicles Roadside Equipment	RSE-C2F-SNMP
traffic monitoring application status	Connected Vehicles Roadside Equipment	Ohio DOT Statewide ATMS	RSE-C2F-SNMP
traffic situation data	Connected Vehicles Roadside Equipment	Ohio DOT Statewide ATMS	RSE-C2F
transportation operational strategies	County and City Traffic Management Centers	Ohio DOT Statewide ATMS	NTCIP-DATEX
transportation operational strategies	Ohio DOT Statewide ATMS	County and City Traffic Management Centers	NTCIP-DATEX
transportation operational strategies	Ohio DOT Statewide ATMS	Ohio DOT District Offices	NTCIP-DATEX
transportation operational strategies	Ohio DOT Statewide ATMS	Ohio DOT OHGO Traveler Information System	NTCIP-DATEX
transportation operational strategies	Ohio DOT Statewide ATMS	Ohio DOT Traffic Signal Systems	NTCIP-DATEX
transportation operational strategies	Ohio DOT Statewide ATMS	Ohio EPA Air Quality Management System	XML
transportation operational strategies	Ohio DOT Statewide ATMS	Ohio State Highway Patrol State Communications Center	XML
transportation operational strategies	Ohio DOT Statewide ATMS	Ohio Turnpike Central Dispatch	NTCIP-DATEX
transportation operational strategies	Ohio DOT Traffic Signal Systems	Ohio DOT Statewide ATMS	NTCIP-DATEX

Information Flow	Source	Destination	Profile Recommendation
transportation operational strategies	Ohio Turnpike Central Dispatch	Ohio DOT Statewide ATMS	NTCIP-DATEX
transportation system status	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
transportation system status	Ohio State Highway Patrol Posts	Ohio DOT Statewide ATMS	XML
transportation system status	Ohio Statewide EOC/JDF	Ohio DOT Statewide ATMS	XML
variable speed limit control	Ohio DOT Statewide ATMS	Ohio DOT Variable Speed Limit Signs	NTCIP-SNMP
variable speed limit status	Ohio DOT Variable Speed Limit Signs	Ohio DOT Statewide ATMS	NTCIP-SNMP
vehicle signage application info	Ohio DOT Statewide ATMS	Connected Vehicles Roadside Equipment	RSE-C2F-SNMP
vehicle signage application status	Connected Vehicles Roadside Equipment	Ohio DOT Statewide ATMS	RSE-C2F-SNMP
video surveillance control	Ohio DOT Statewide ATMS	Ohio DOT CCTV Cameras	NTCIP-SNMP
weather information	National Weather Service	Ohio DOT Statewide ATMS	XML
work plan feedback	Ohio DOT Statewide ATMS	Ohio DOT District Offices	NTCIP-DATEX
work zone information	Ohio DOT District Offices	Ohio DOT Statewide ATMS	NTCIP-DATEX
work zone information	Ohio DOT Statewide ATMS	County and City Maintenance Dispatch Facilities	XML

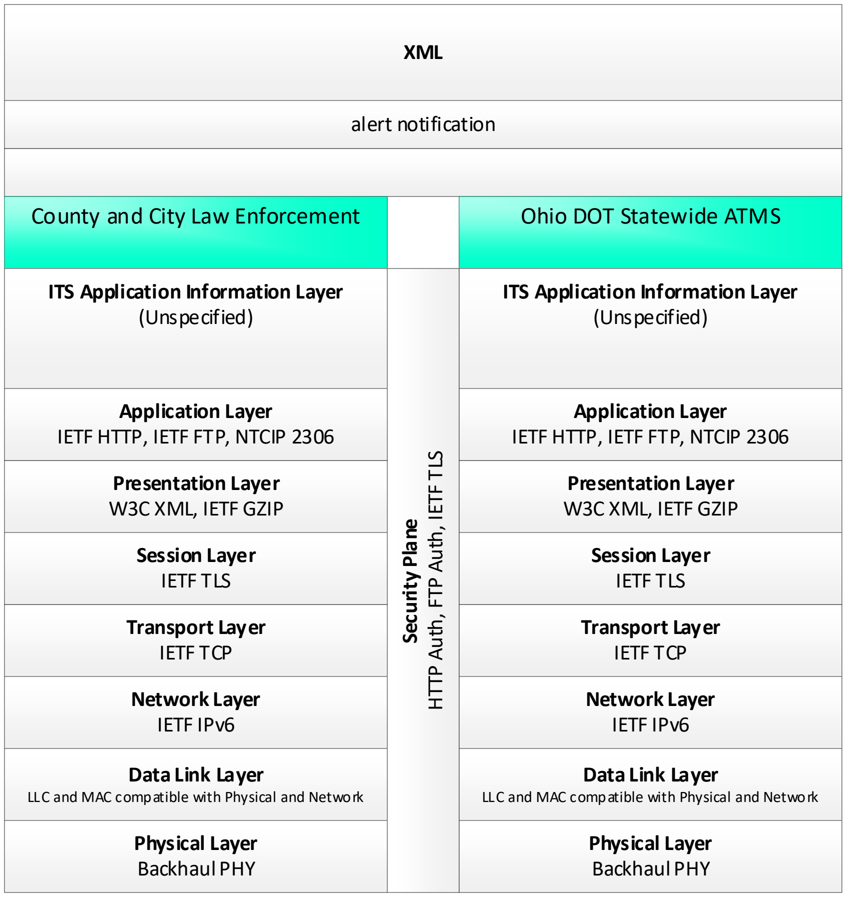
Appendix F – ATMS Interface Communications Diagrams

For each ATMS related information flow triple (flow, source, destination), a communication diagram has been generated and illustrated in this appendix. These communications diagrams are based on the profiles listed in Appendix E. Each diagram identifies the standards for each layer of the protocol stack for the particular information flow triple identified. For reference the legend for the diagram labels is Flow (F:), Source (S:), Destination (D:), and Profile (P:).



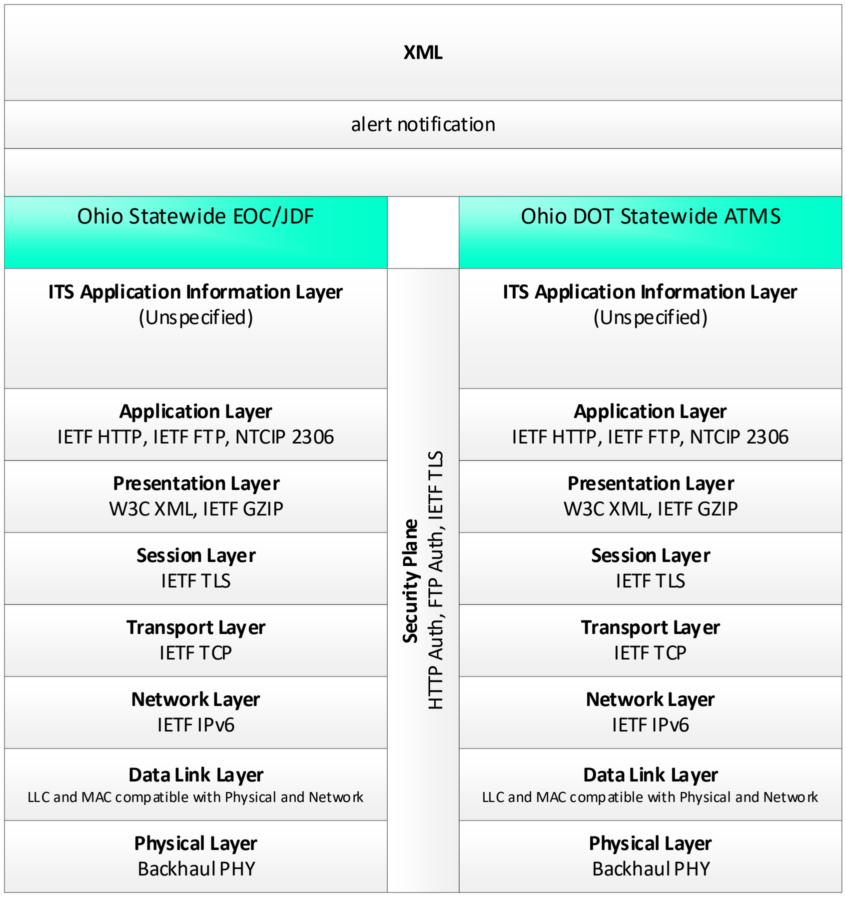
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 50 F: air quality information / S: Ohio EPA Air Quality Management System -> D: Ohio DOT Statewide ATMS / P: XML



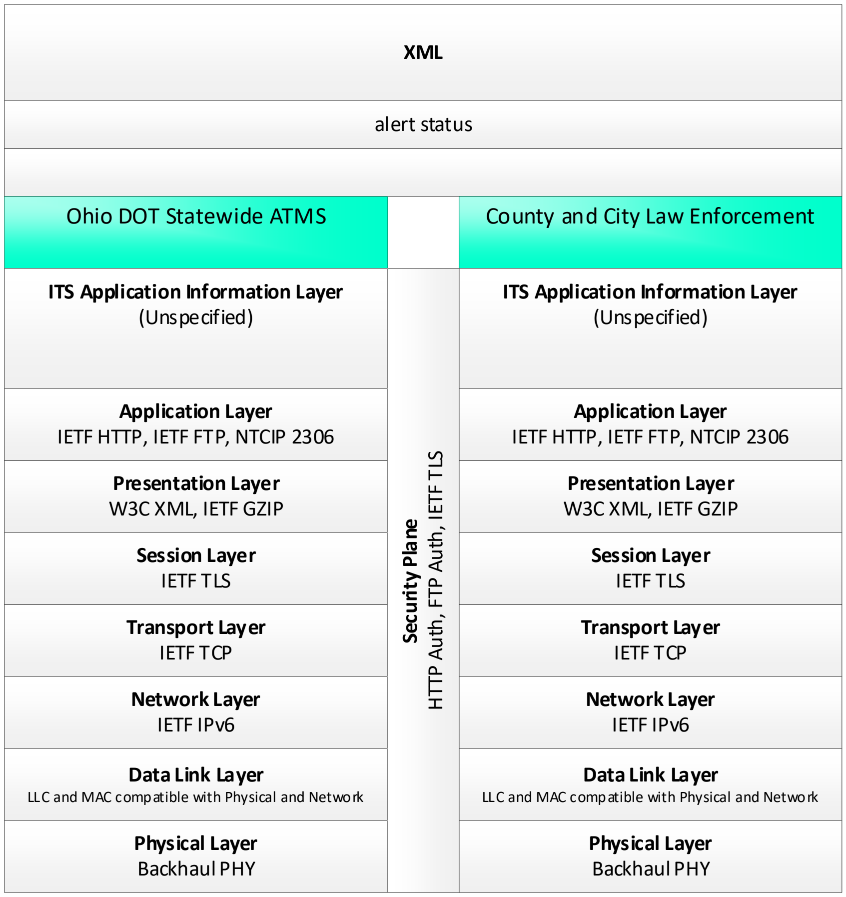
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 51 F: alert notification / S: County and City Law Enforcement -> D: Ohio DOT Statewide ATMS / P: XML



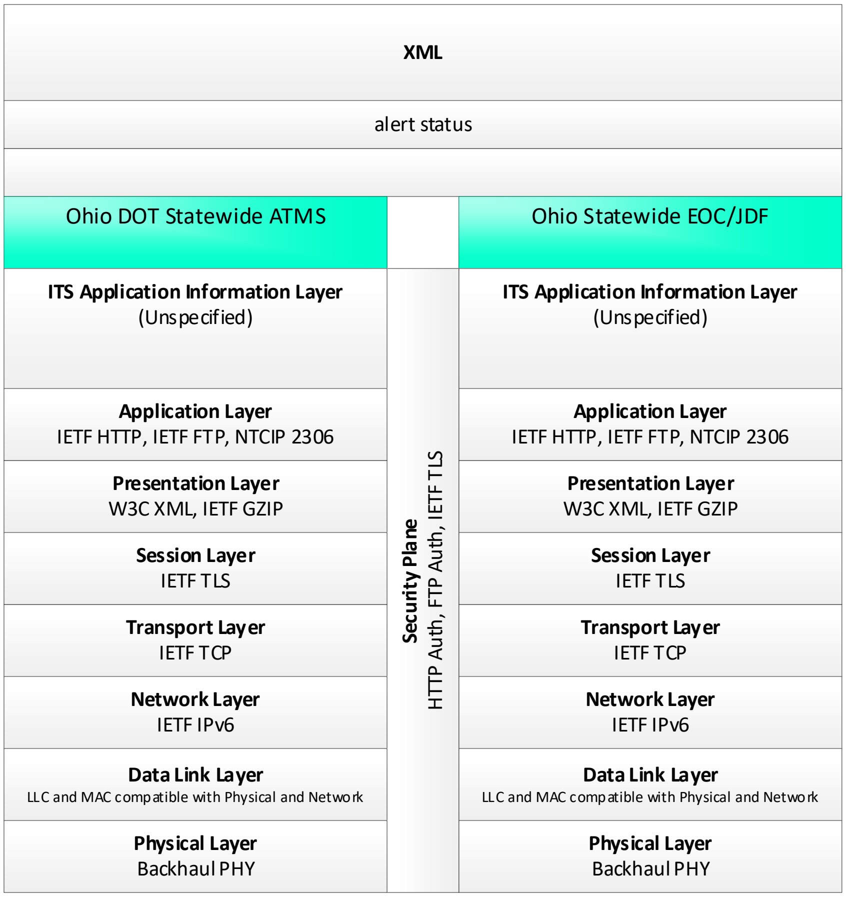
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 52 F: alert notification / S: Ohio Statewide EOC/JDF -> D: Ohio DOT Statewide ATMS / P: XML



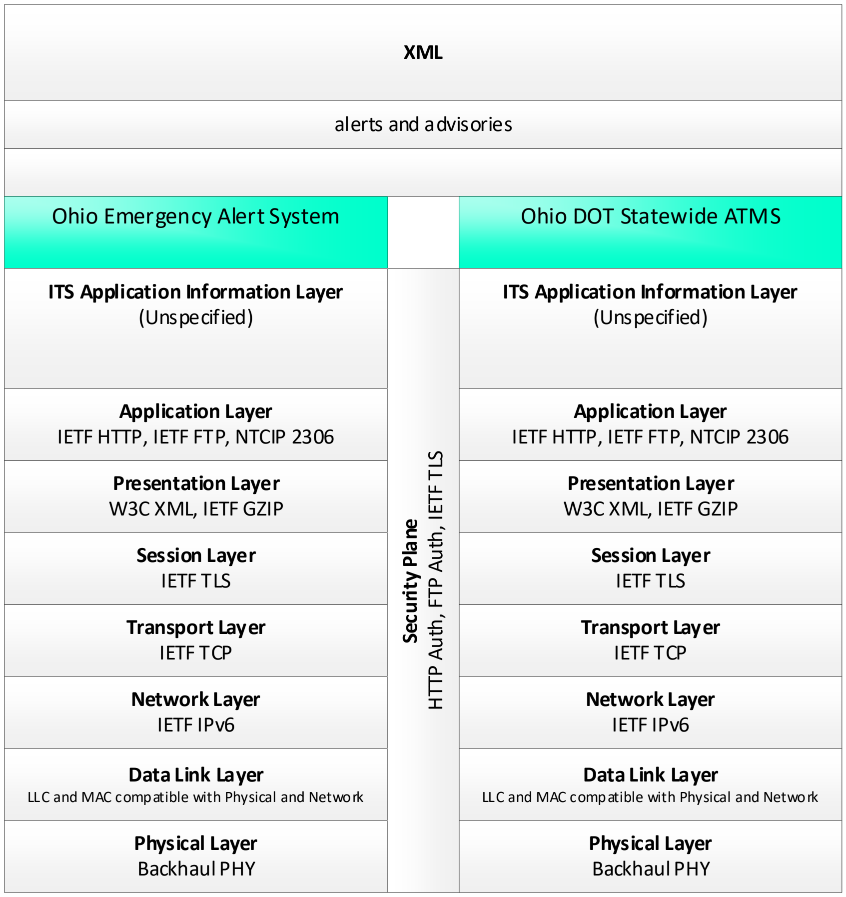
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 53 F: alert status / S: Ohio DOT Statewide ATMS -> D: County and City Law Enforcement / P: XML



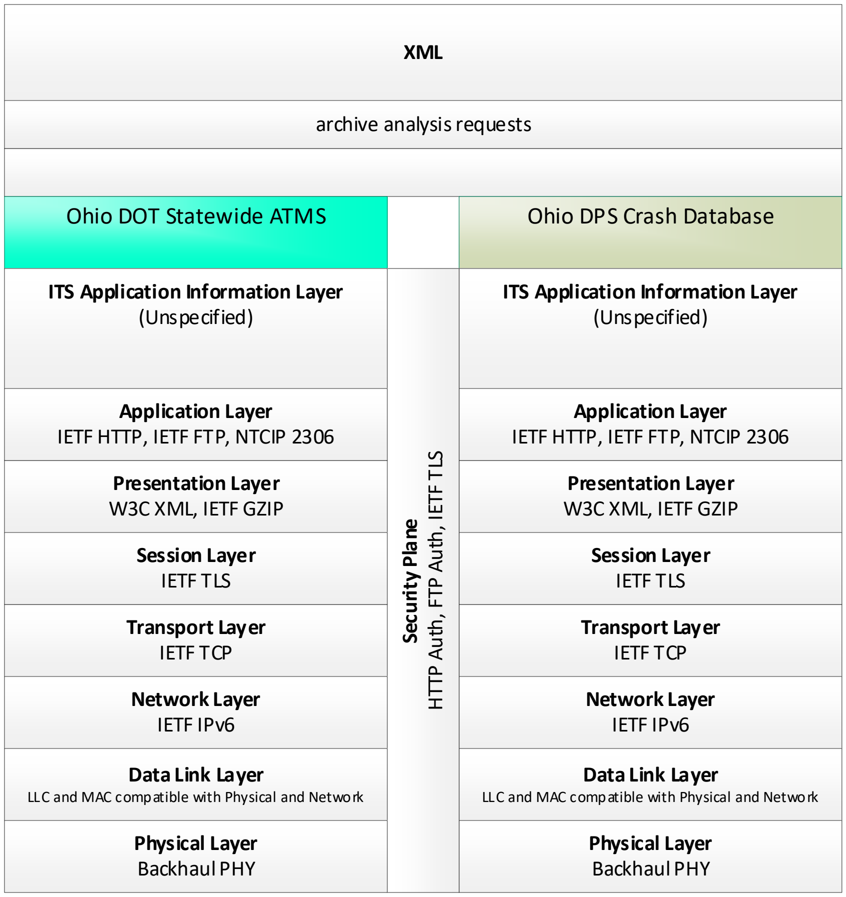
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 54 F: alert status / S: Ohio DOT Statewide ATMS -> D: Ohio Statewide EOC/JDF / P: XML



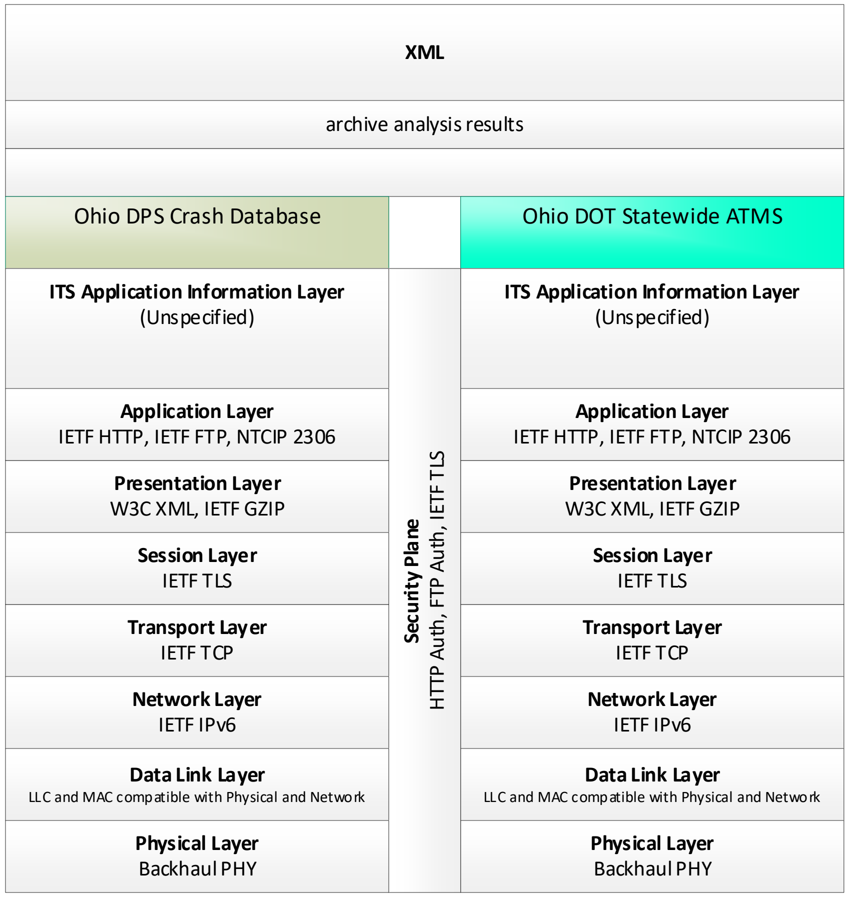
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 55 F: alerts and advisories / S: Ohio Emergency Alert System -> D: Ohio DOT Statewide ATMS / P: XML



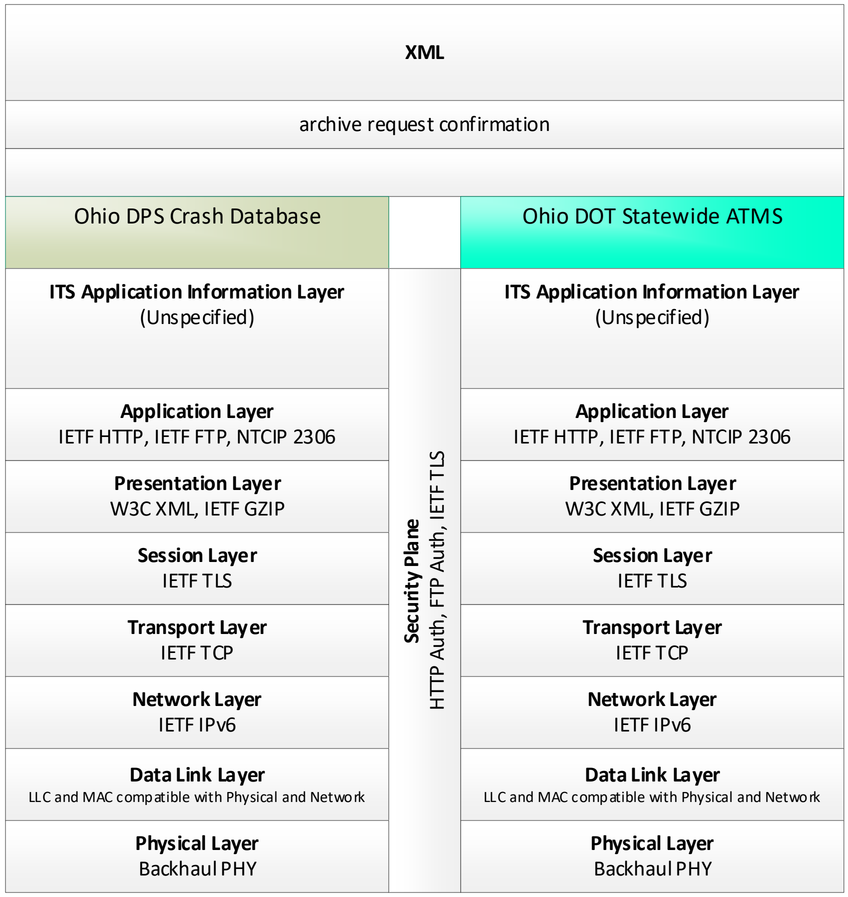
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 56 F: archive analysis requests / S: Ohio DOT Statewide ATMS -> D: Ohio DPS Crash Database / P: XML



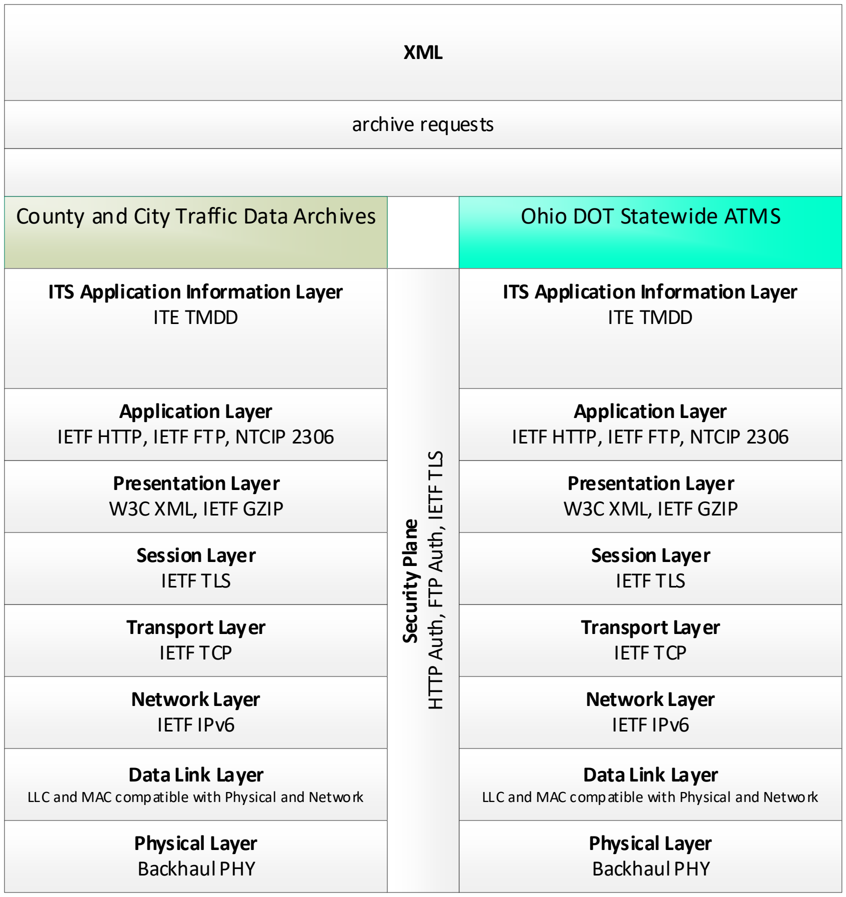
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 57 F: archive analysis results / S: Ohio DPS Crash Database -> D: Ohio DOT Statewide ATMS / P: XML



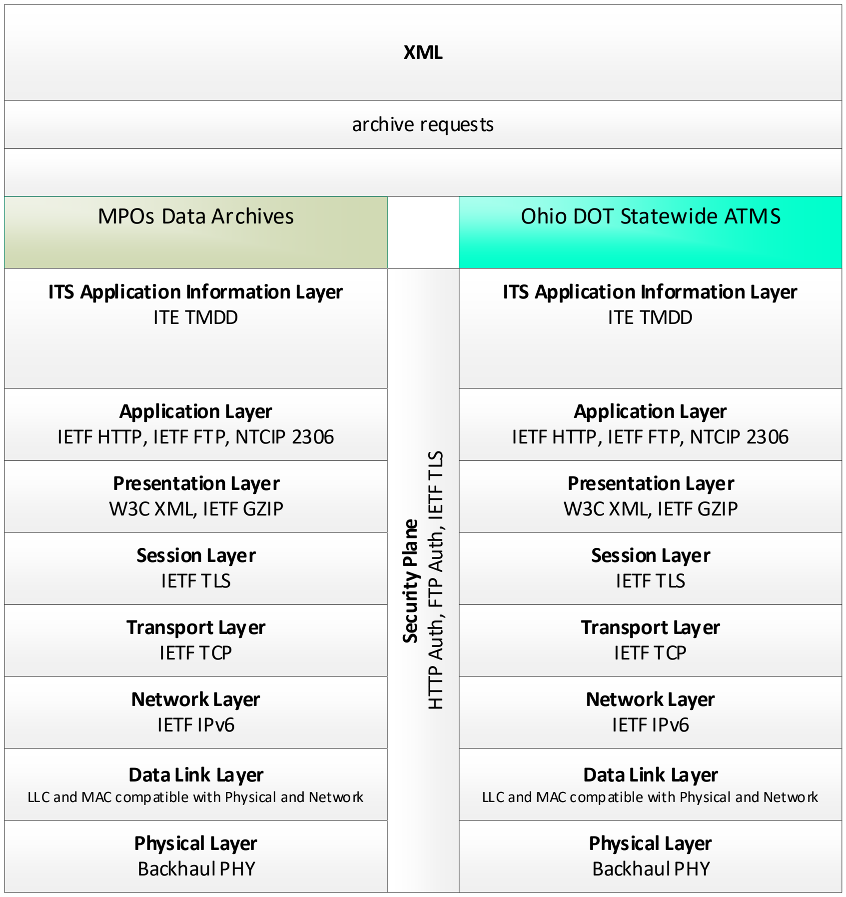
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 58 F: archive request confirmation / S: Ohio DPS Crash Database -> D: Ohio DOT Statewide ATMS / P: XML



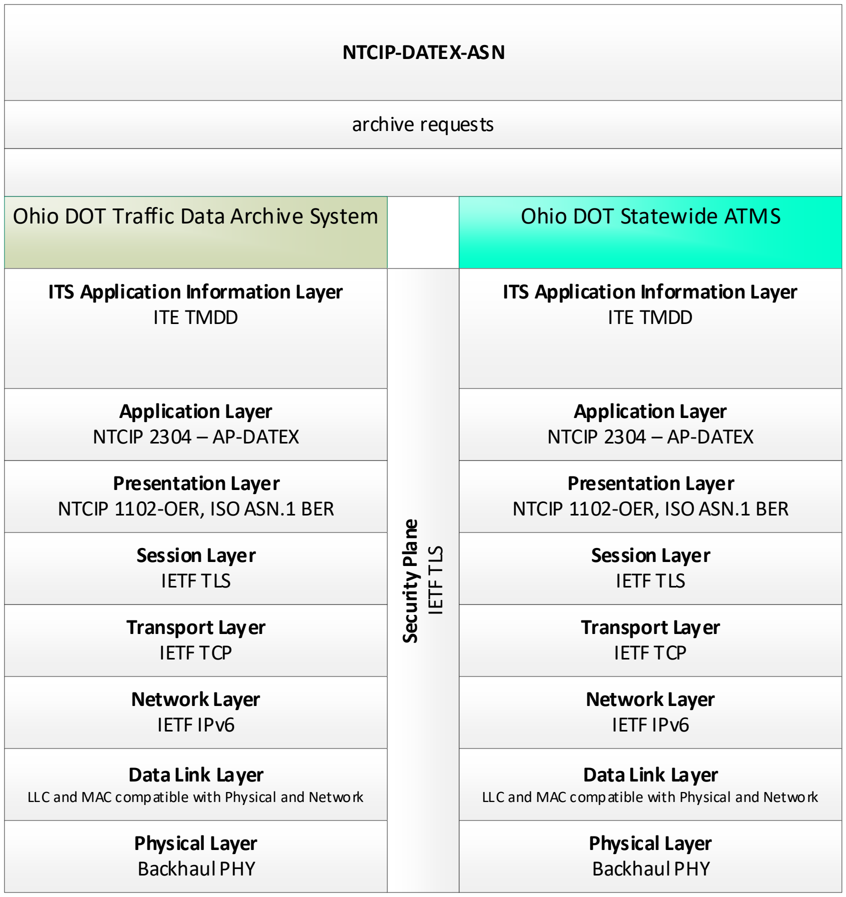
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 59 F: archive requests / S: County and City Traffic Data Archives -> D: Ohio DOT Statewide ATMS / P: XML



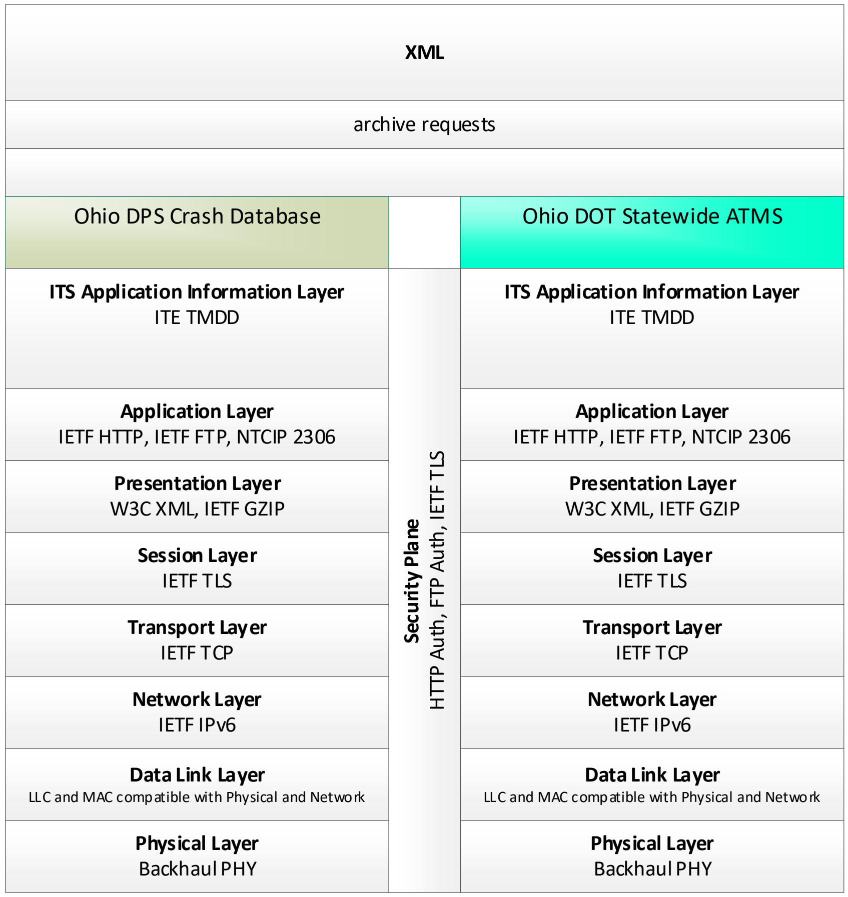
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 60 F: archive requests / S: MPOs Data Archives -> D: Ohio DOT Statewide ATMS / P: XML



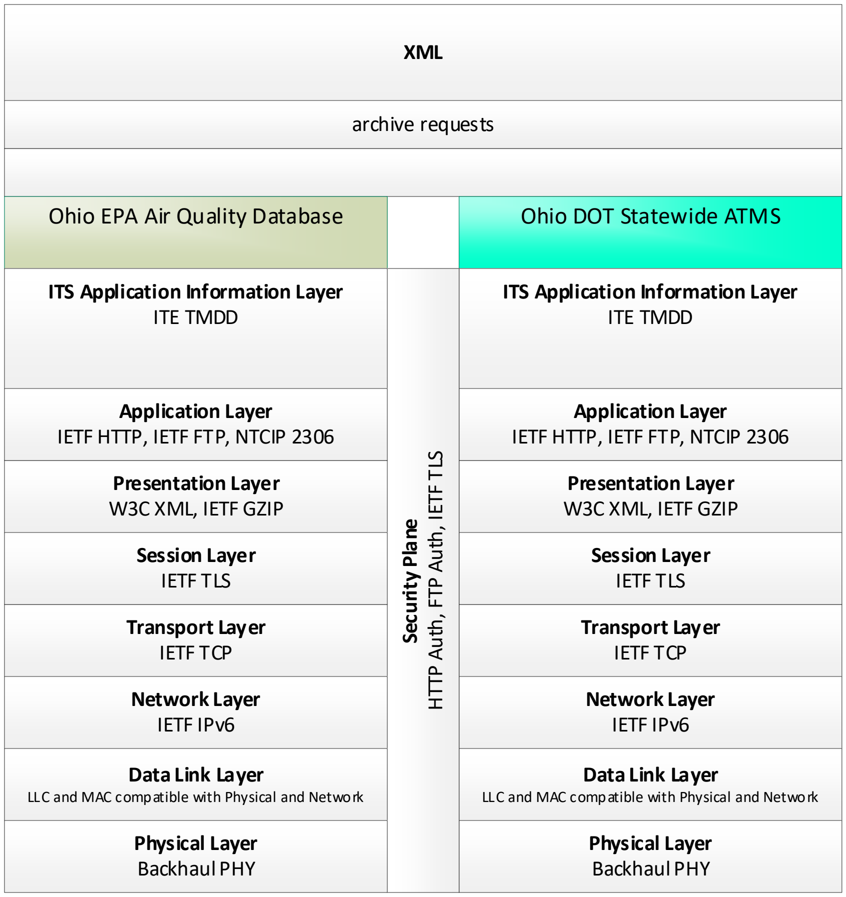
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 61 F: archive requests / S: Ohio DOT Traffic Data Archive System -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



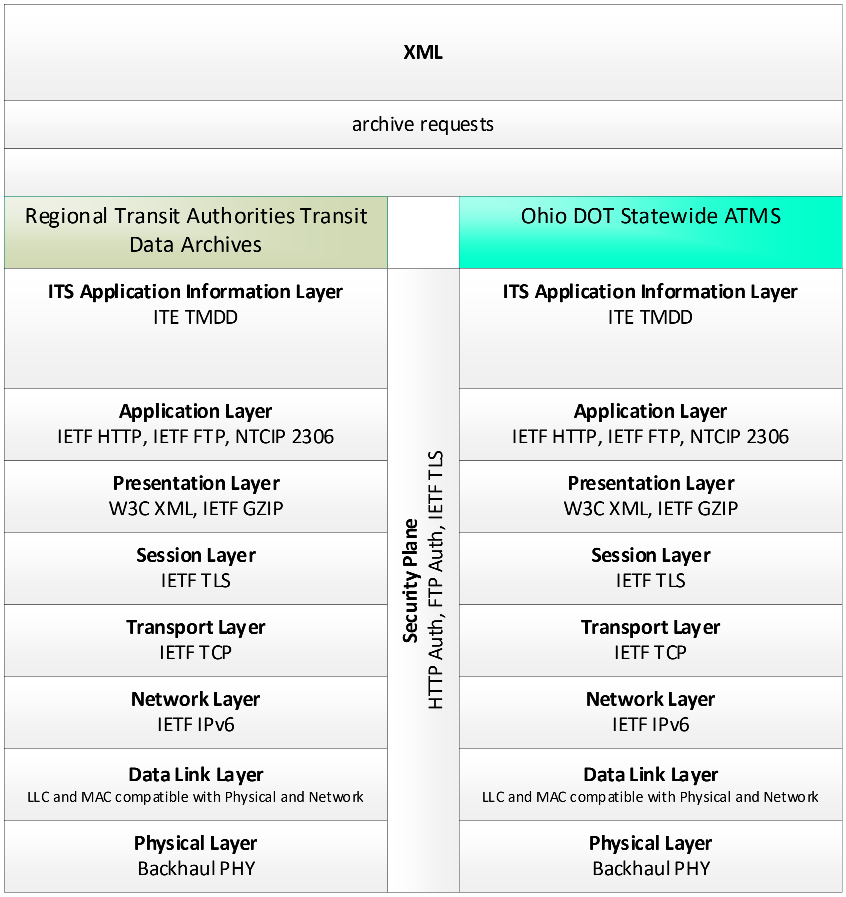
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 62 F: archive requests / S: Ohio DPS Crash Database -> D: Ohio DOT Statewide ATMS / P: XML



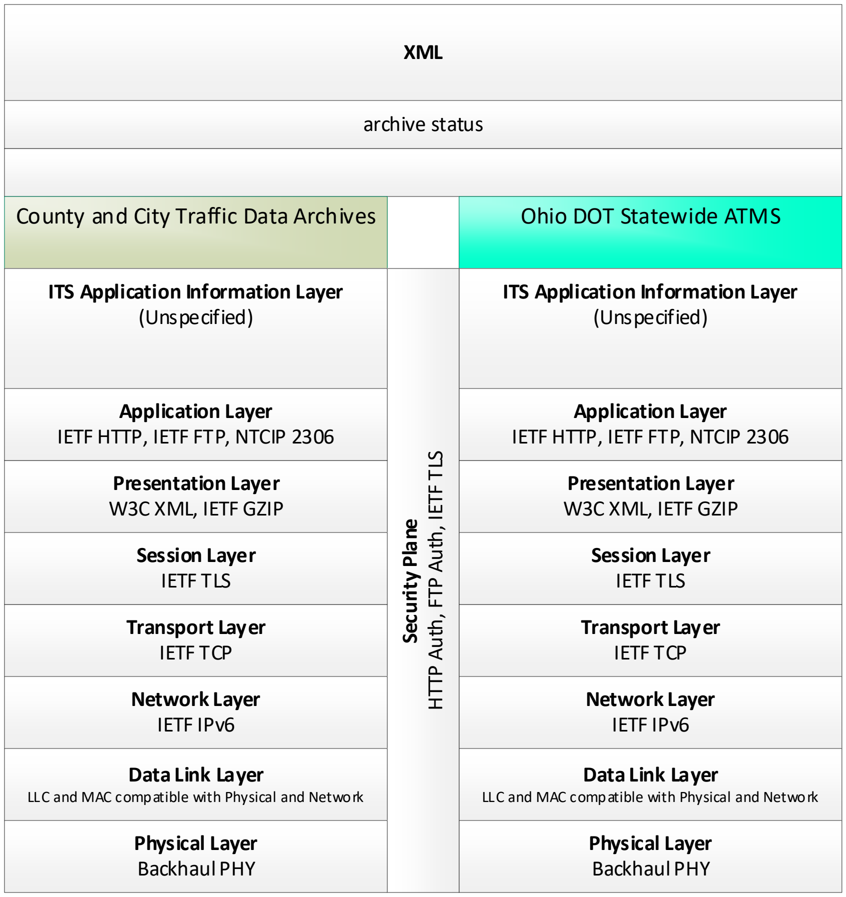
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 63 F: archive requests / S: Ohio EPA Air Quality Database -> D: Ohio DOT Statewide ATMS / P: XML



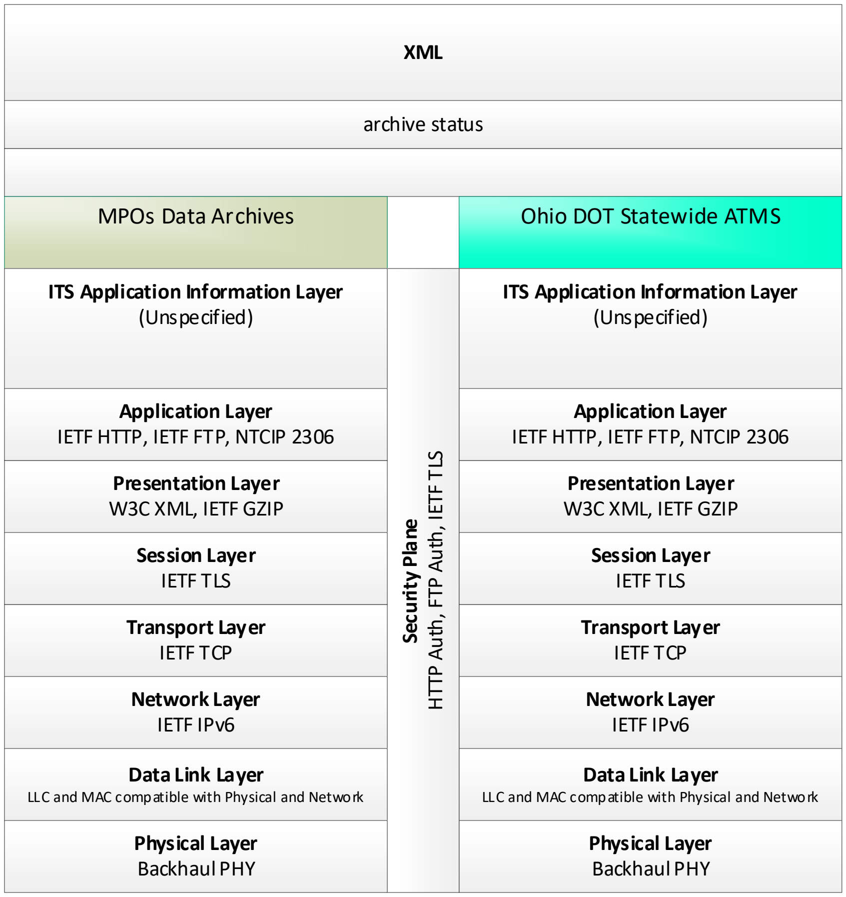
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 64 F: archive requests / S: Regional Transit Authorities Transit Data Archives -> D: Ohio DOT Statewide ATMS / P: XML



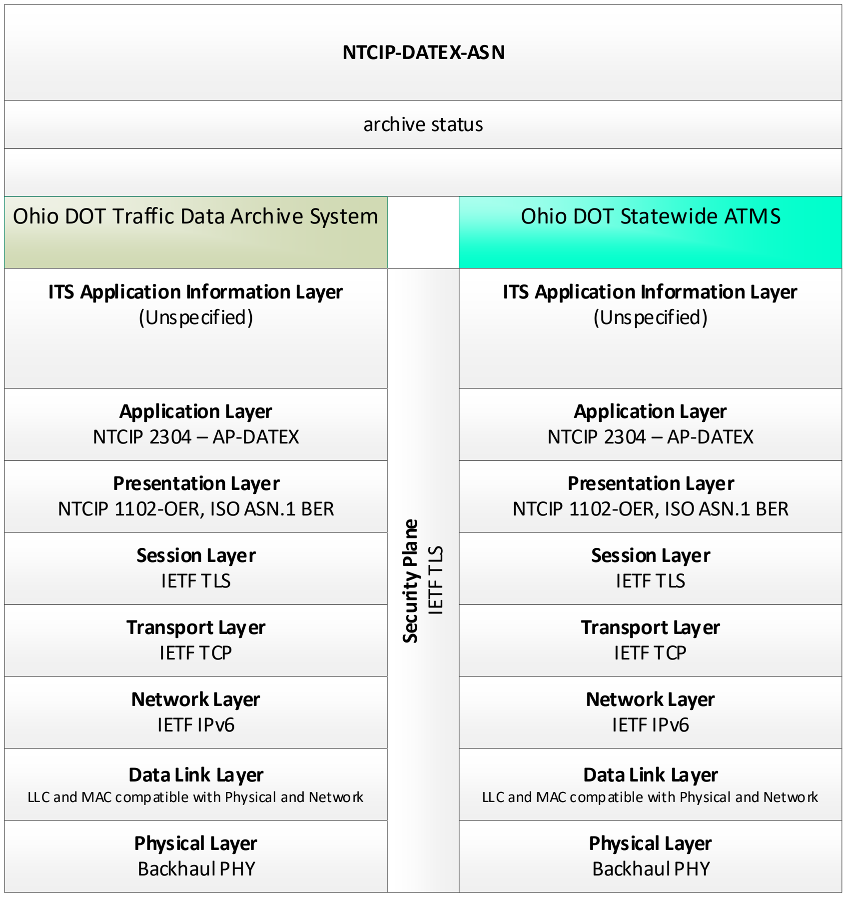
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 65 F: archive status / S: County and City Traffic Data Archives -> D: Ohio DOT Statewide ATMS / P: XML



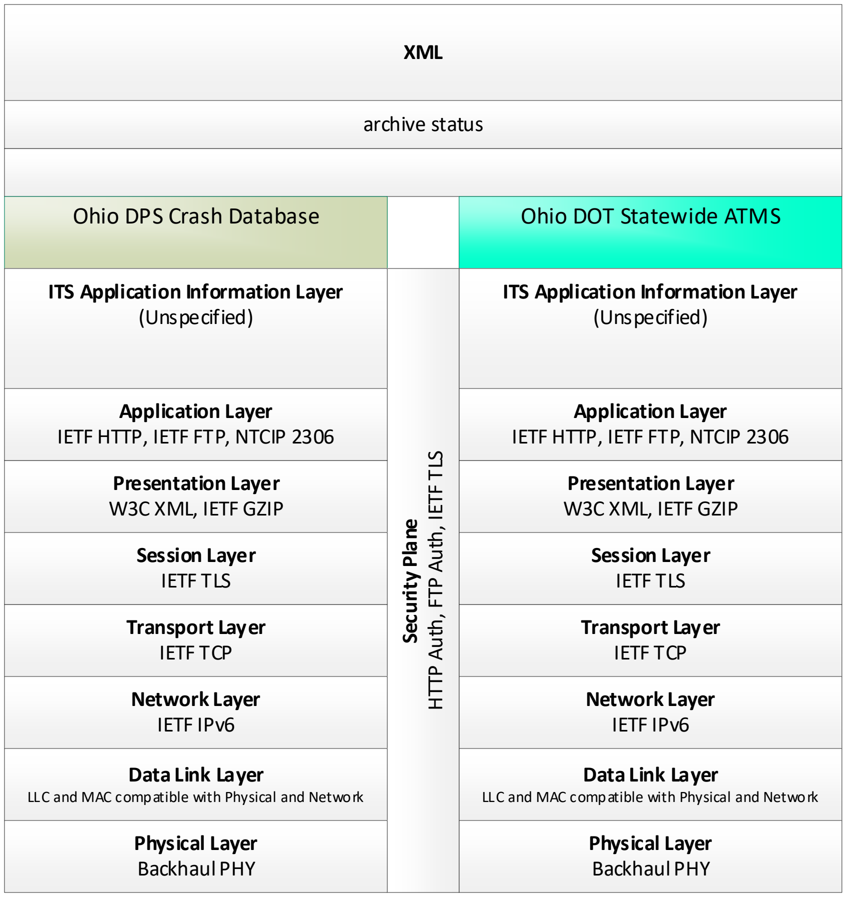
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 66 F: archive status / S: MPOs Data Archives -> D: Ohio DOT Statewide ATMS / P: XML



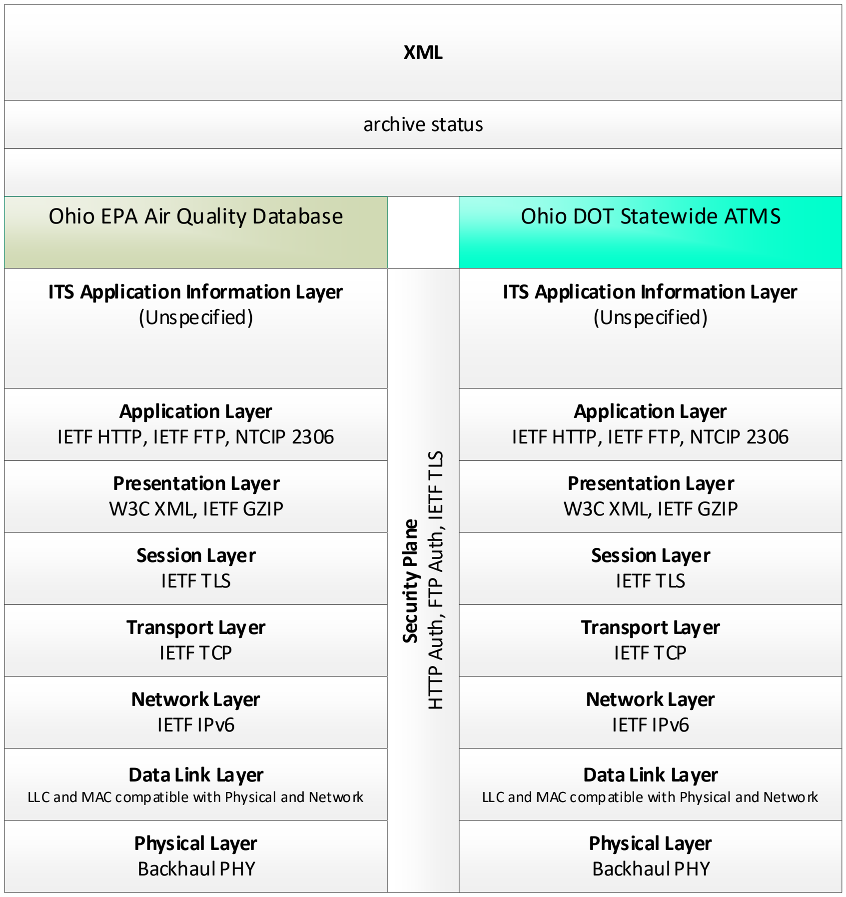
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 67 F: archive status / S: Ohio DOT Traffic Data Archive System -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



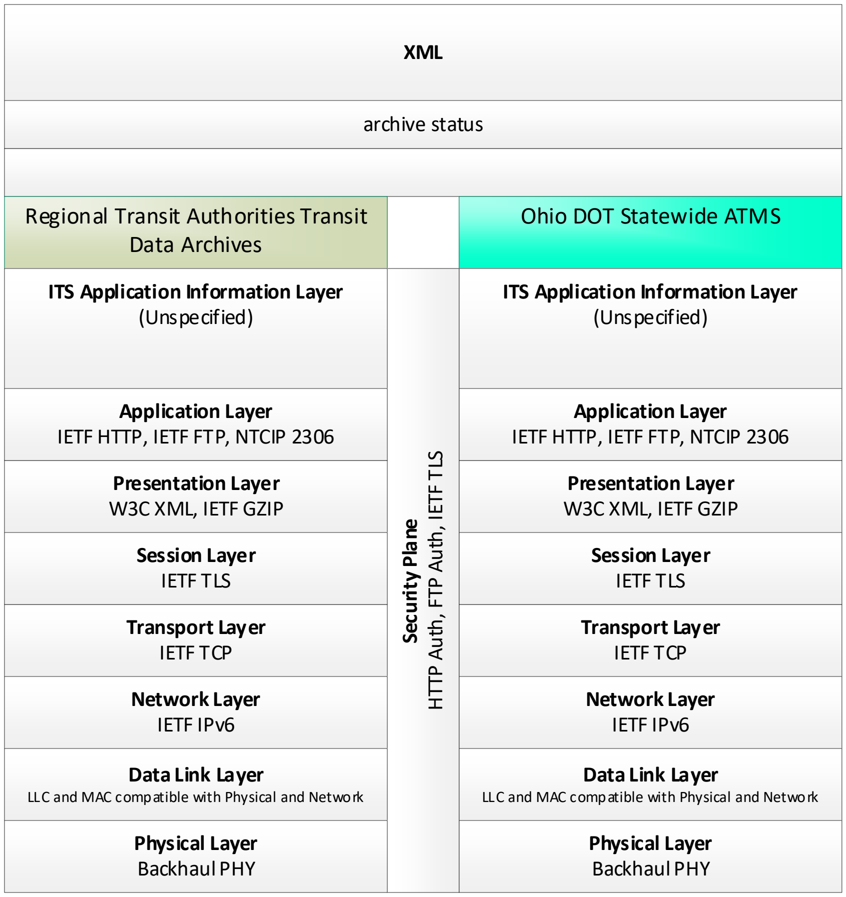
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 68 F: archive status / S: Ohio DPS Crash Database -> D: Ohio DOT Statewide ATMS / P: XML



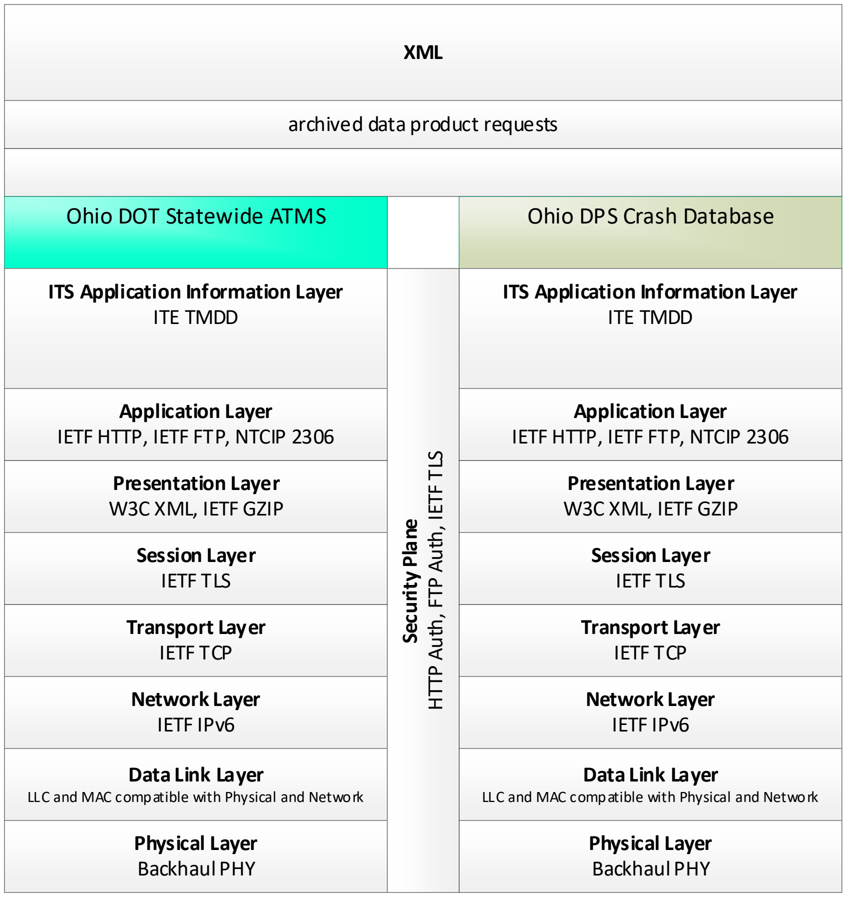
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 69 F: archive status / S: Ohio EPA Air Quality Database -> D: Ohio DOT Statewide ATMS / P: XML



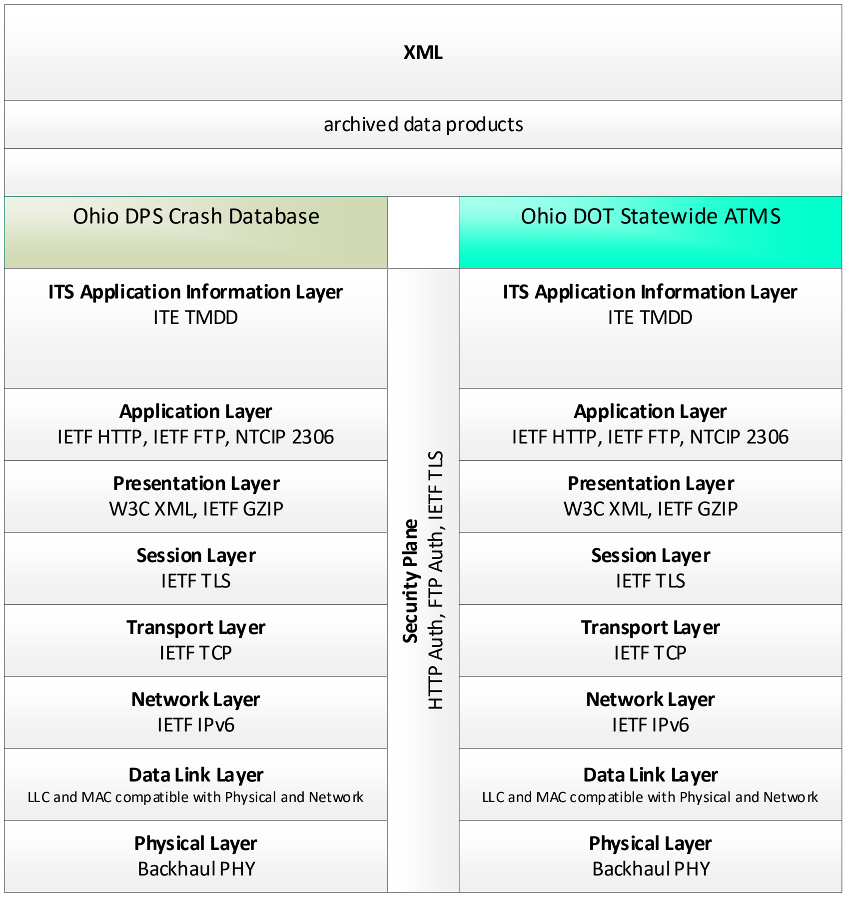
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 70 F: archive status / S: Regional Transit Authorities Transit Data Archives -> D: Ohio DOT Statewide ATMS / P: NTCIP



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 71 F: archived data product requests / S: Ohio DOT Statewide ATMS -> D: Ohio DPS Crash Database / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 72 F: archived data products / S: Ohio DPS Crash Database -> D: Ohio DOT Statewide ATMS / P: XML

RSE Center to Field SNMP		
automated lane control data		
Ohio DOT Statewide ATMS		Connected Vehicles Roadside Equipment
ITS Application Information Layer (Unspecified)	**Security Plane** IEEE 1609.2	**ITS Application Information Layer** (Unspecified)
Application Layer IETF SNMP		**Application Layer** IETF SNMP
Presentation Layer ISO ASN.1 BER	**Security Plane** IETF DTLS, IETF TLS	**Presentation Layer** ISO ASN.1 BER
Session Layer IETF DTLS, IETF TLS		**Session Layer** IETF DTLS, IETF TLS
Transport Layer IETF UDP, IETF TCP		**Transport Layer** IETF UDP, IETF TCP
Network Layer IETF IPv6		**Network Layer** IETF IPv6
Data Link Layer LLC and MAC compatible with Physical and Network		**Data Link Layer** LLC and MAC compatible with Physical and Network
Physical Layer Backhaul PHY		**Physical Layer** Backhaul PHY

* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 73 F: automated lane control data / S: Ohio DOT Statewide ATMS -> D: Connected Vehicles Roadside Equipment / P: RSE C2F-SNMP

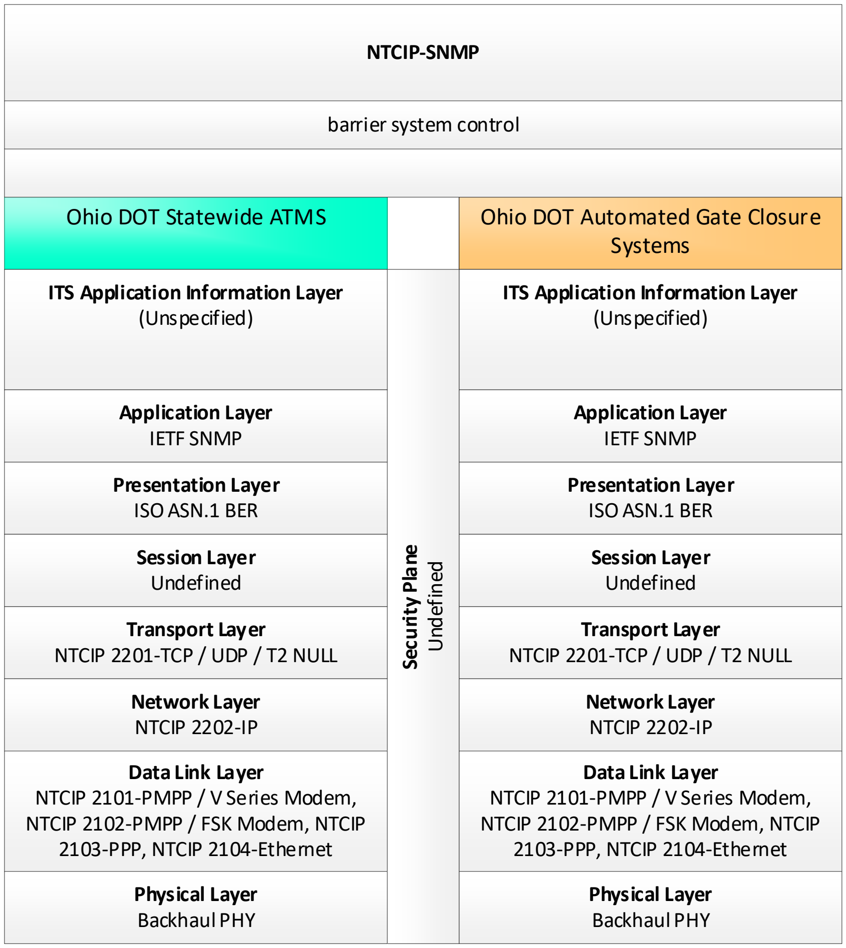
RSE Center to Field SNMP

automated lane status

Connected Vehicles Roadside Equipment		Ohio DOT Statewide ATMS
ITS Application Information Layer (Unspecified)	**Security Plane** IEEE 1609.2	**ITS Application Information Layer** (Unspecified)
Application Layer IETF SNMP		**Application Layer** IETF SNMP
Presentation Layer ISO ASN.1 BER	**Security Plane** IETF DTLS, IETF TLS	**Presentation Layer** ISO ASN.1 BER
Session Layer IETF DTLS, IETF TLS		**Session Layer** IETF DTLS, IETF TLS
Transport Layer IETF UDP, IETF TCP		**Transport Layer** IETF UDP, IETF TCP
Network Layer IETF IPv6		**Network Layer** IETF IPv6
Data Link Layer LLC and MAC compatible with Physical and Network		**Data Link Layer** LLC and MAC compatible with Physical and Network
Physical Layer Backhaul PHY		**Physical Layer** Backhaul PHY

* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 74 F: automated lane status / S: Connected Vehicles Roadside Equipment -> D: Ohio DOT Statewide ATMS / P: RSE C2F-SNMP



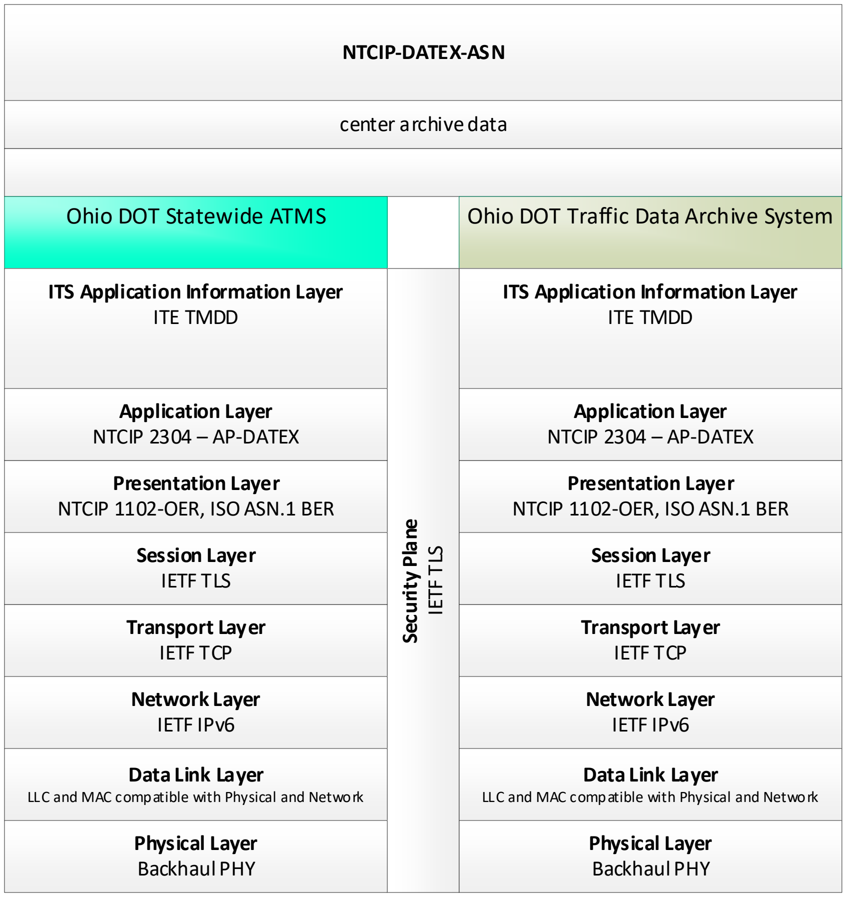
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 75 F: barrier system control / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Automated Gate Closure Systems / P: NTCIP-SNMP

NTCIP-SNMP		
barrier system status		
Ohio DOT Automated Gate Closure Systems		Ohio DOT Statewide ATMS
ITS Application Information Layer (Unspecified)	**Security Plane** Undefined	**ITS Application Information Layer** (Unspecified)
Application Layer IETF SNMP		**Application Layer** IETF SNMP
Presentation Layer ISO ASN.1 BER		**Presentation Layer** ISO ASN.1 BER
Session Layer Undefined		**Session Layer** Undefined
Transport Layer NTCIP 2201-TCP / UDP / T2 NULL		**Transport Layer** NTCIP 2201-TCP / UDP / T2 NULL
Network Layer NTCIP 2202-IP		**Network Layer** NTCIP 2202-IP
Data Link Layer NTCIP 2101-PMPP / V Series Modem, NTCIP 2102-PMPP / FSK Modem, NTCIP 2103-PPP, NTCIP 2104-Ethernet		**Data Link Layer** NTCIP 2101-PMPP / V Series Modem, NTCIP 2102-PMPP / FSK Modem, NTCIP 2103-PPP, NTCIP 2104-Ethernet
Physical Layer Backhaul PHY		**Physical Layer** Backhaul PHY

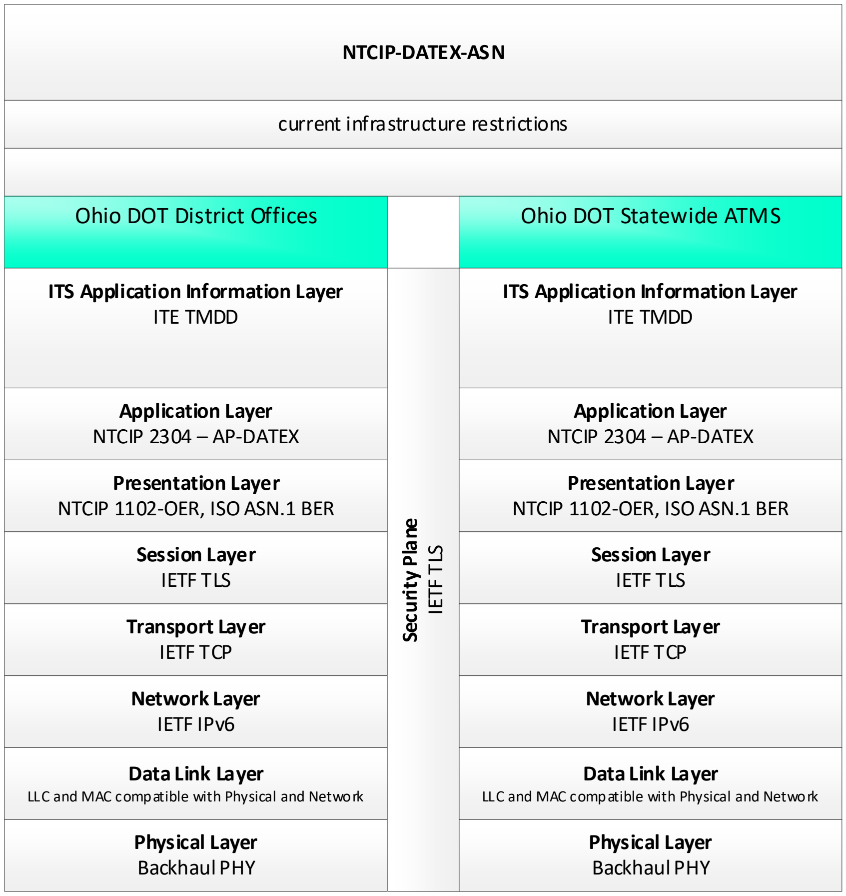
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 76 F: barrier system status / S: Ohio DOT Automated Gate Closure Systems -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

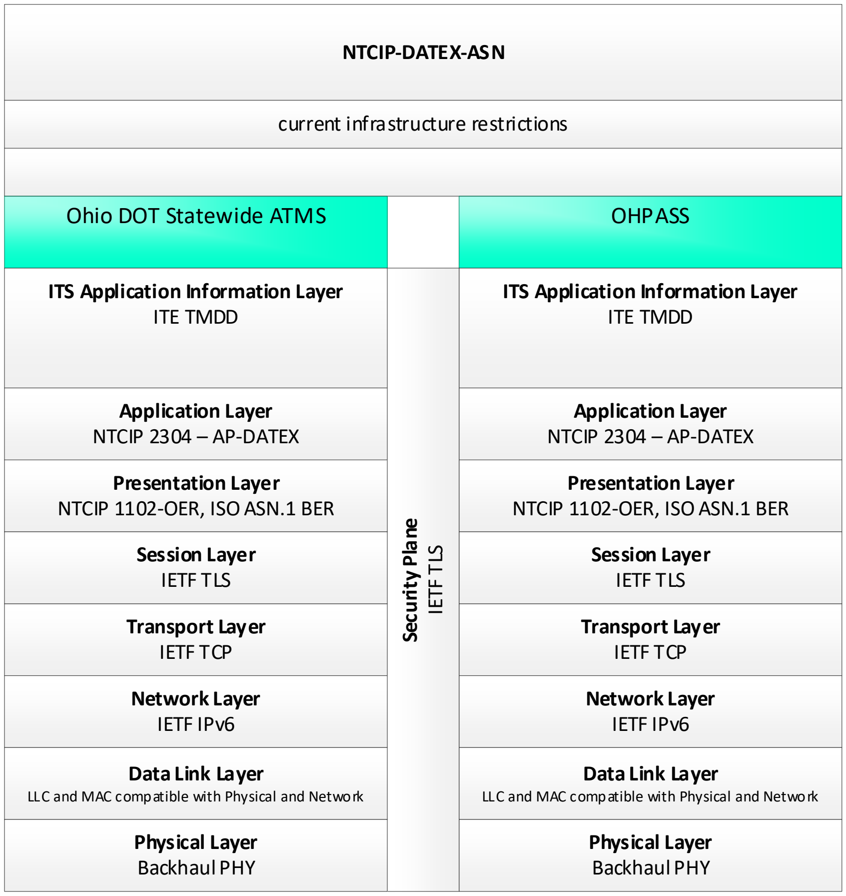
Figure 77 F: center archive data / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Traffic Data Archive System / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- ITE TMDD supports weight, height, and width restrictions, but not special restrictions.

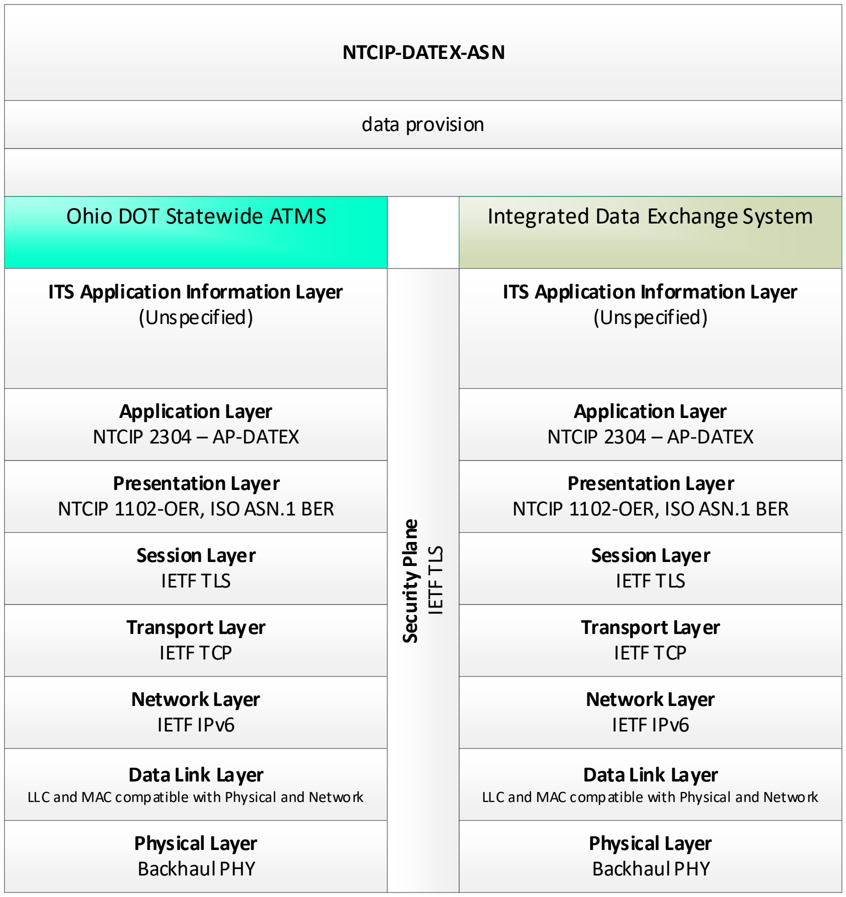
Figure 78 F: current infrastructure restrictions / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

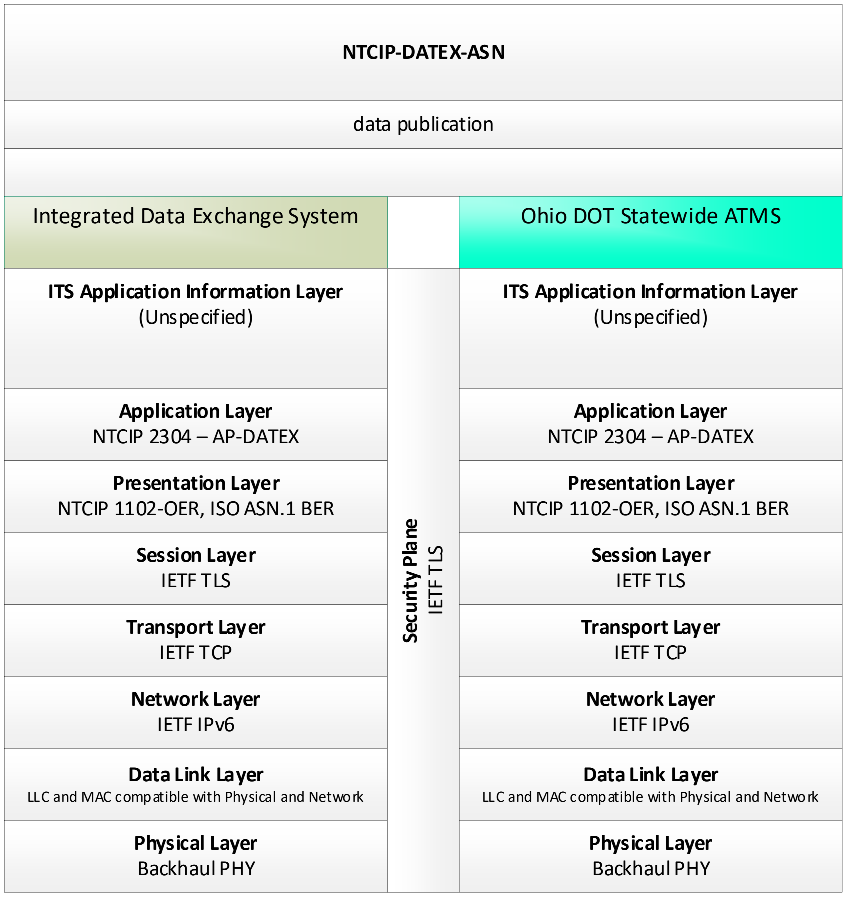
** Information Layer Standard(s) -- ITE TMDD supports weight, height, and width restrictions, but not special restrictions.

Figure 79 F: current infrastructure restrictions / S: Ohio DOT Statewide ATMS -> D: OHPASS / P: NTCIP-DATEX



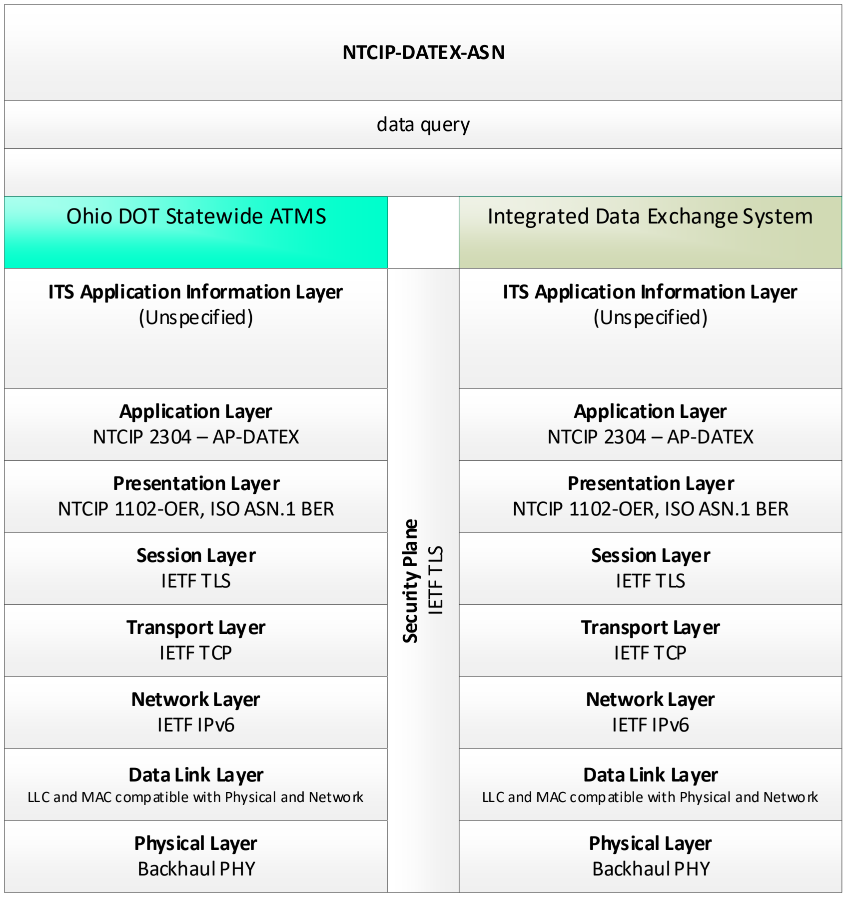
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 80 F: data provision / S: Ohio DOT Statewide ATMS-> D: Integrated Data Exchange System / P: NTCIP-DATEX



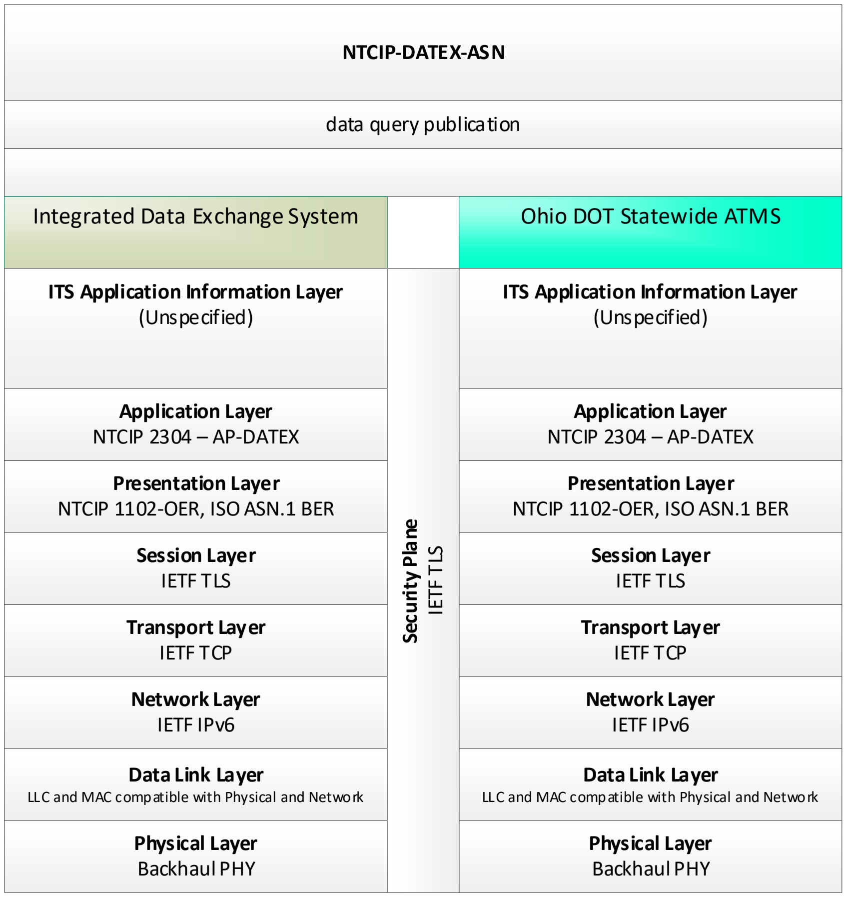
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 81 F: data publication / S: Integrated Data Exchange System -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



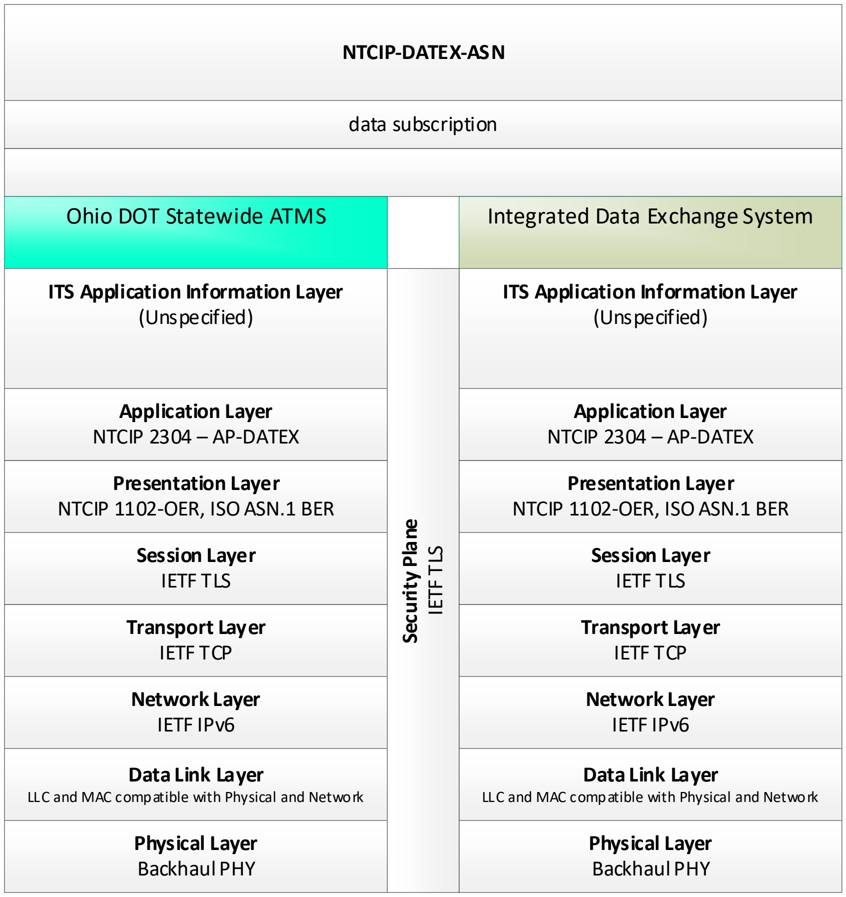
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 82 F: data query / S: Ohio DOT Statewide ATMS -> D: Integrated Data Exchange System / P: NTCIP-DATEX



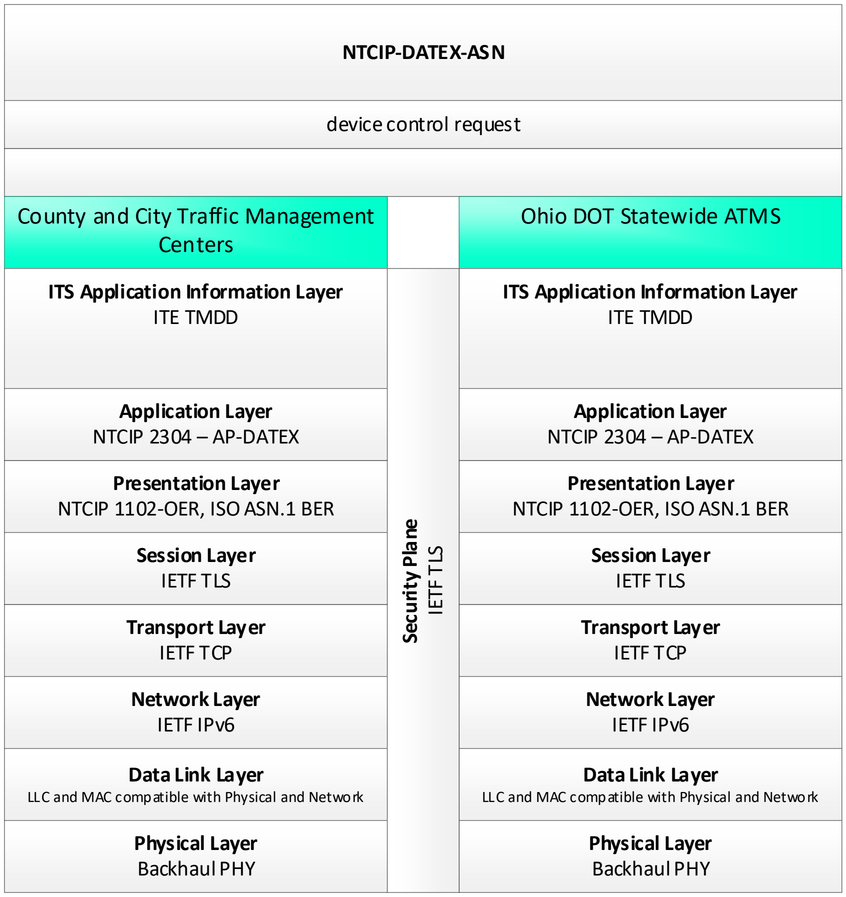
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 83 F: data query publication / S: Integrated Data Exchange System -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



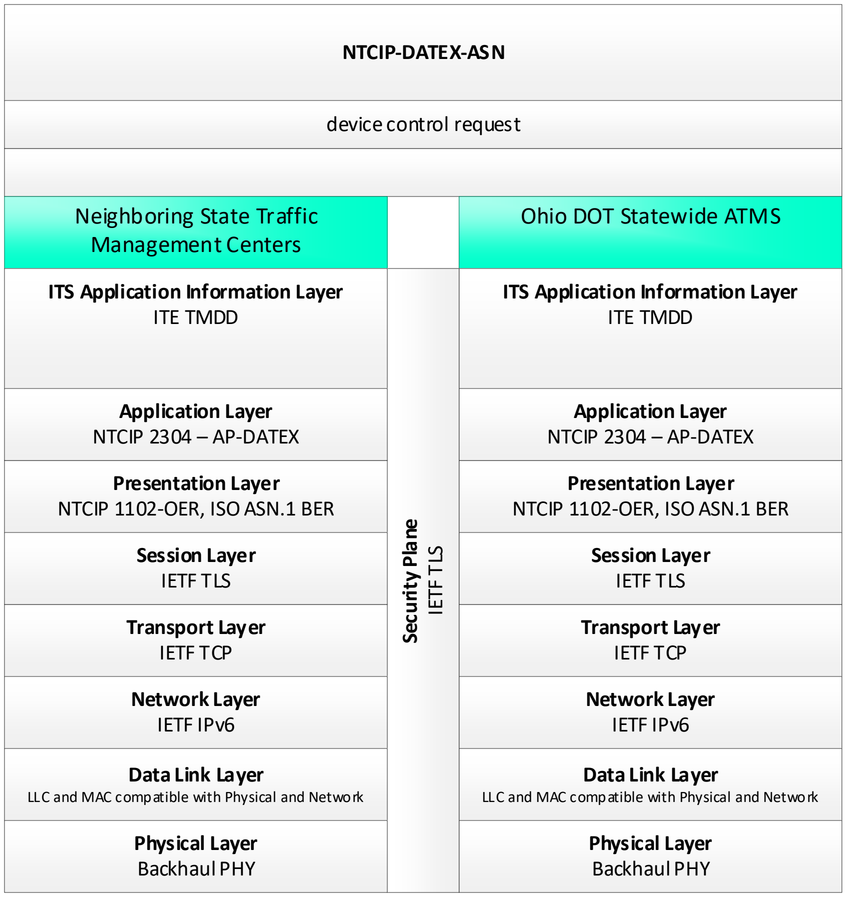
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 84 F: data subscription / S: Ohio DOT Statewide ATMS -> D: Integrated Data Exchange System / P: NTCIP-DATEX



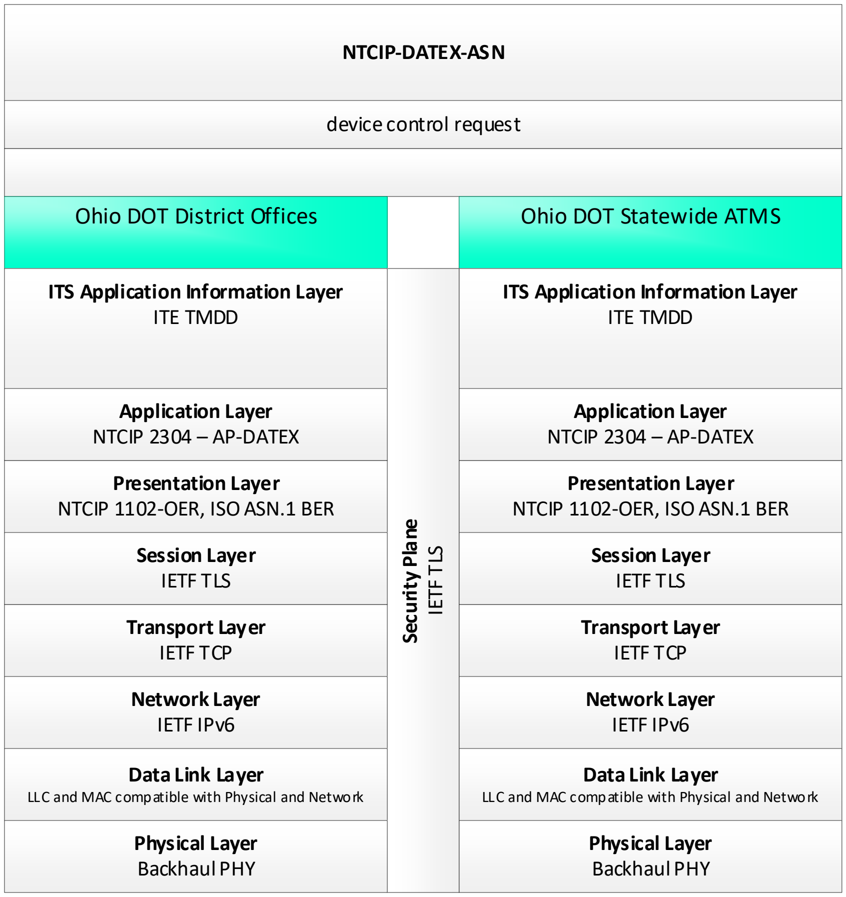
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 85 F: device control request / S: County and City Traffic Management Centers -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



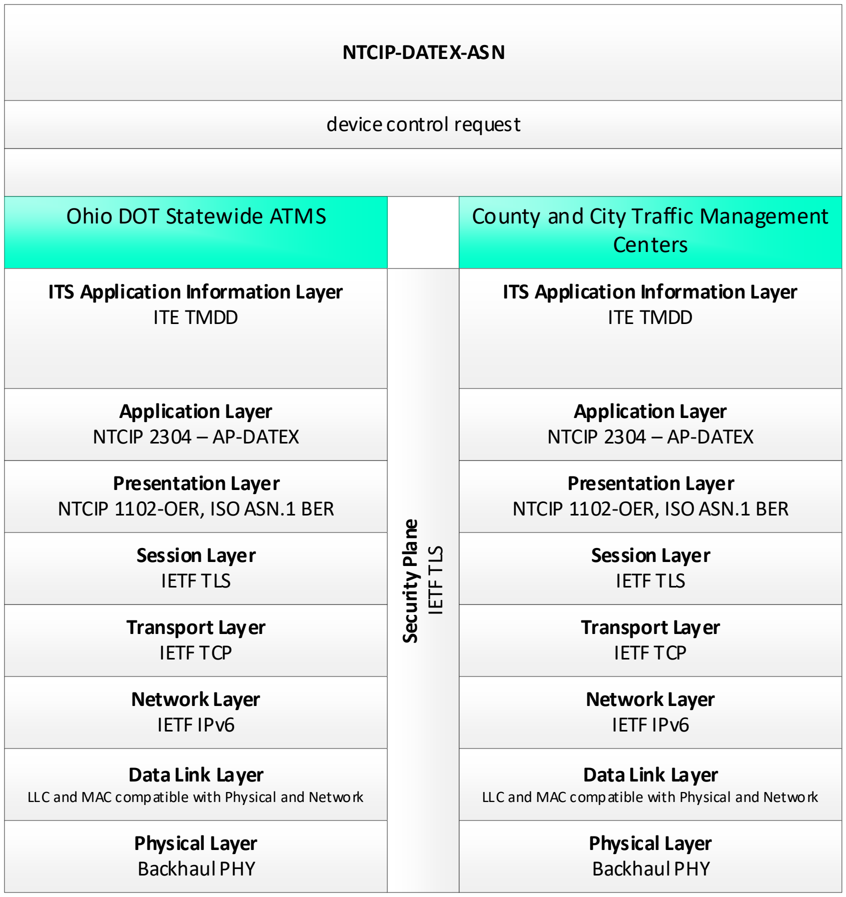
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 86 F: device control request / S: Neighboring State Traffic Management Centers -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



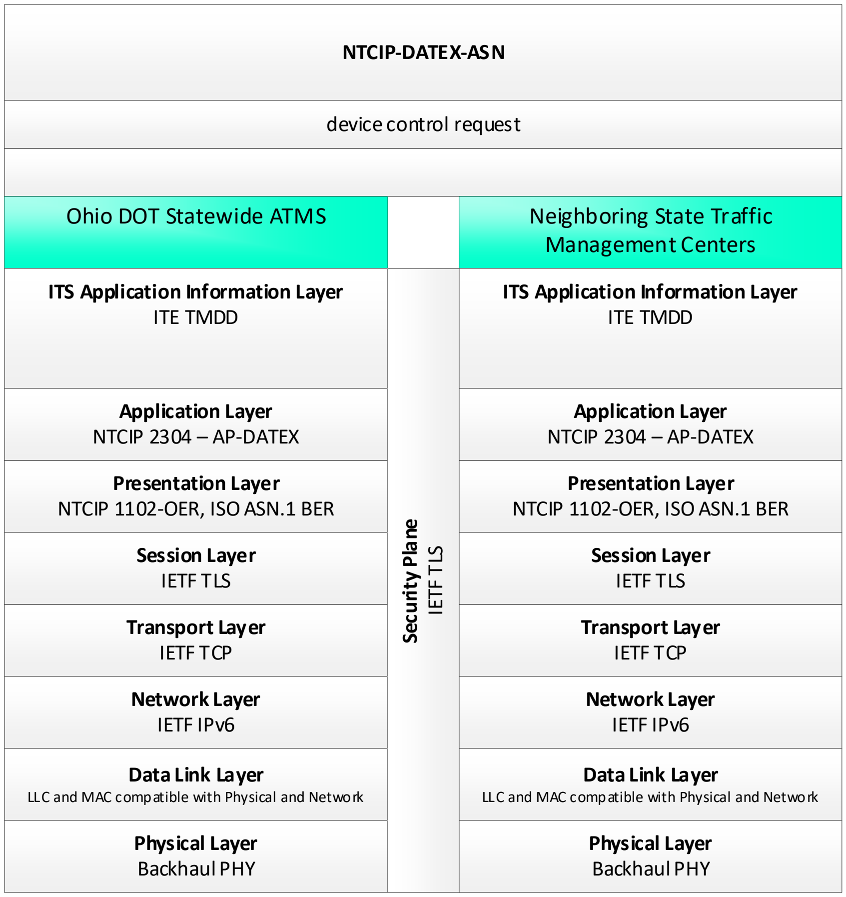
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 87 F: device control request / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



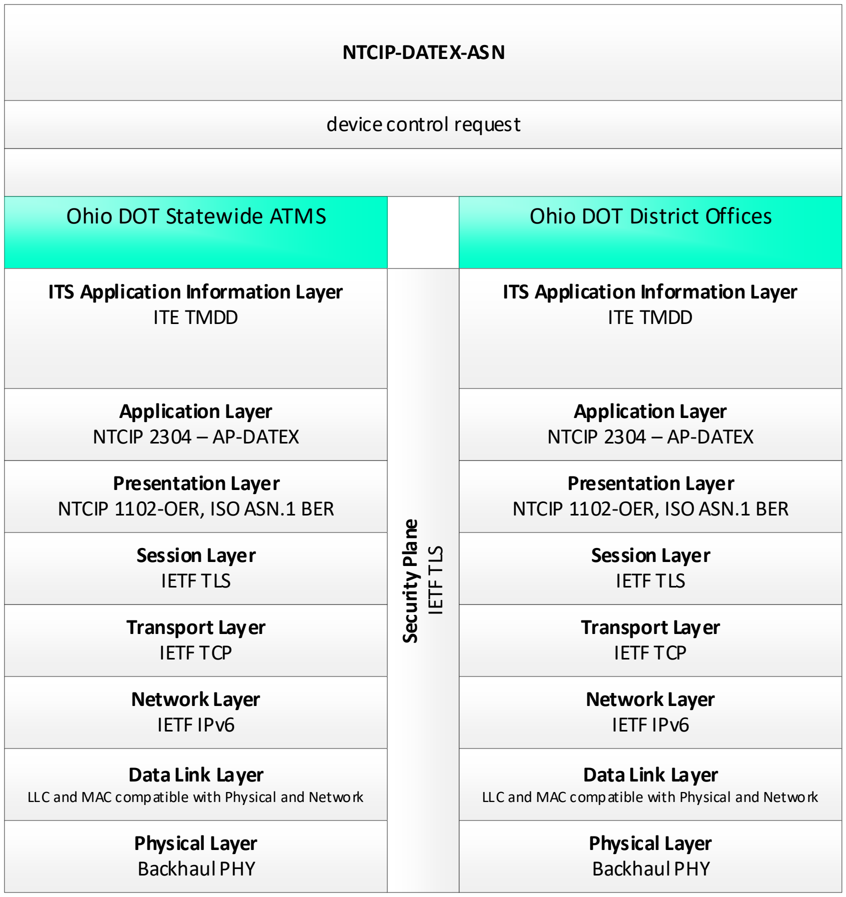
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 88 F: device control request / S: Ohio DOT Statewide ATMS -> D: County and City Traffic Management Centers / P: NTCIP-DATEX



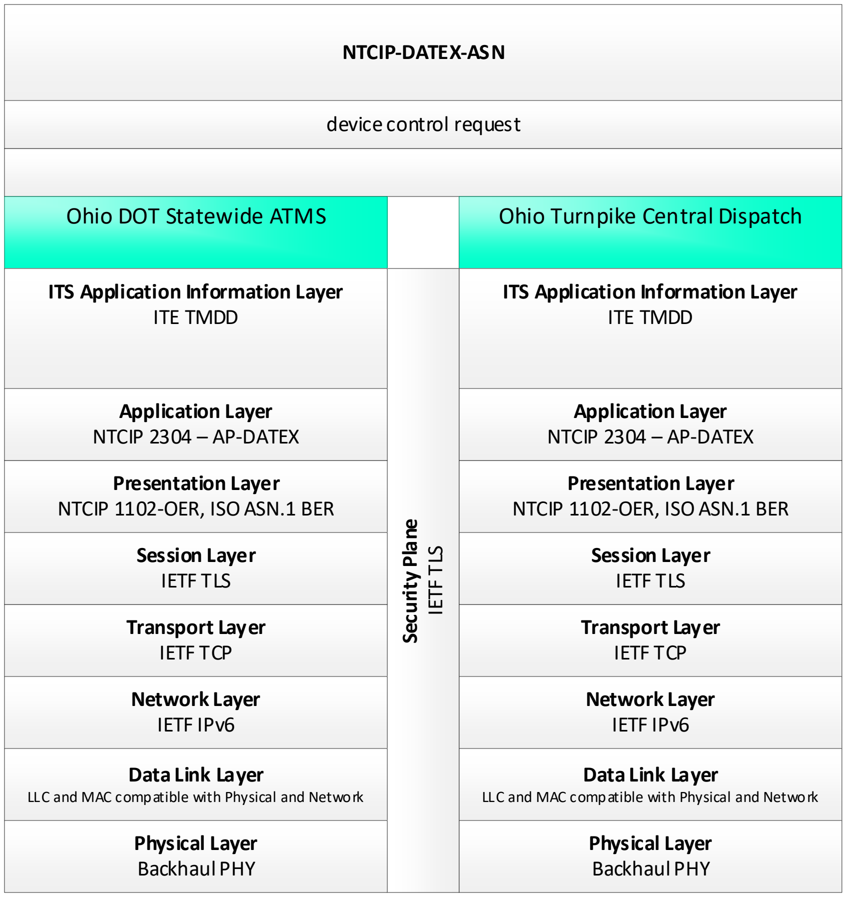
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 89 F: device control request / S: Ohio DOT Statewide ATMS -> D: Neighboring State Traffic Management Centers / P: NTCIP-DATEX



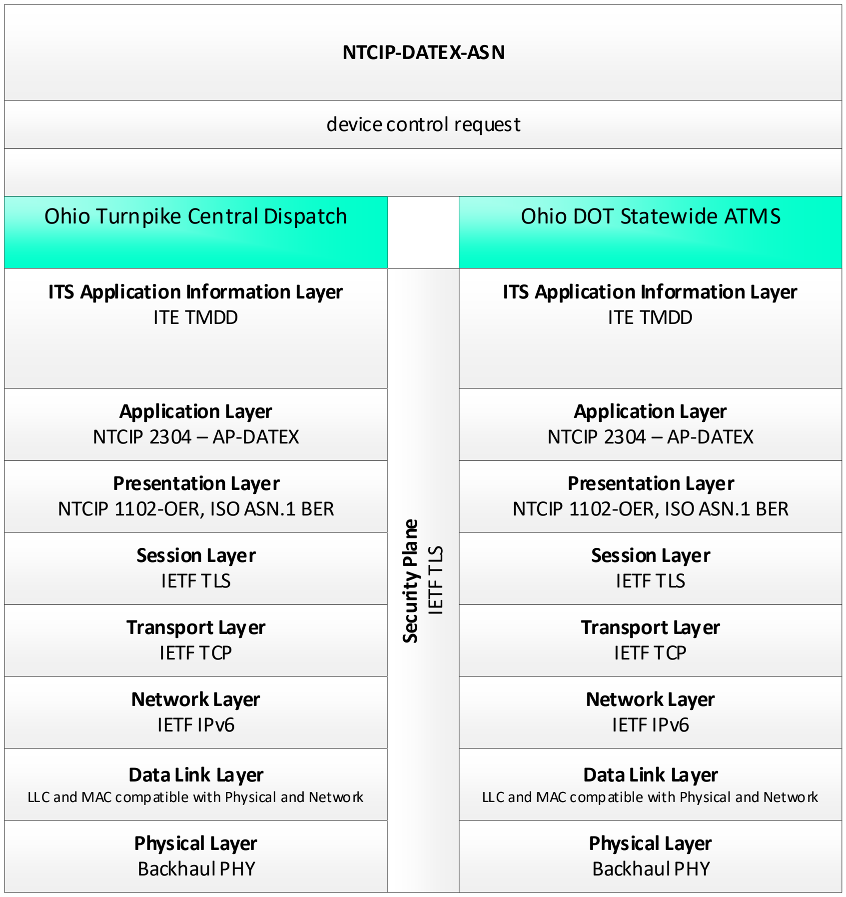
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 90 F: device control request / S: Ohio DOT Statewide ATMS -> D: Ohio DOT District Offices / P: NTCIP-DATEX



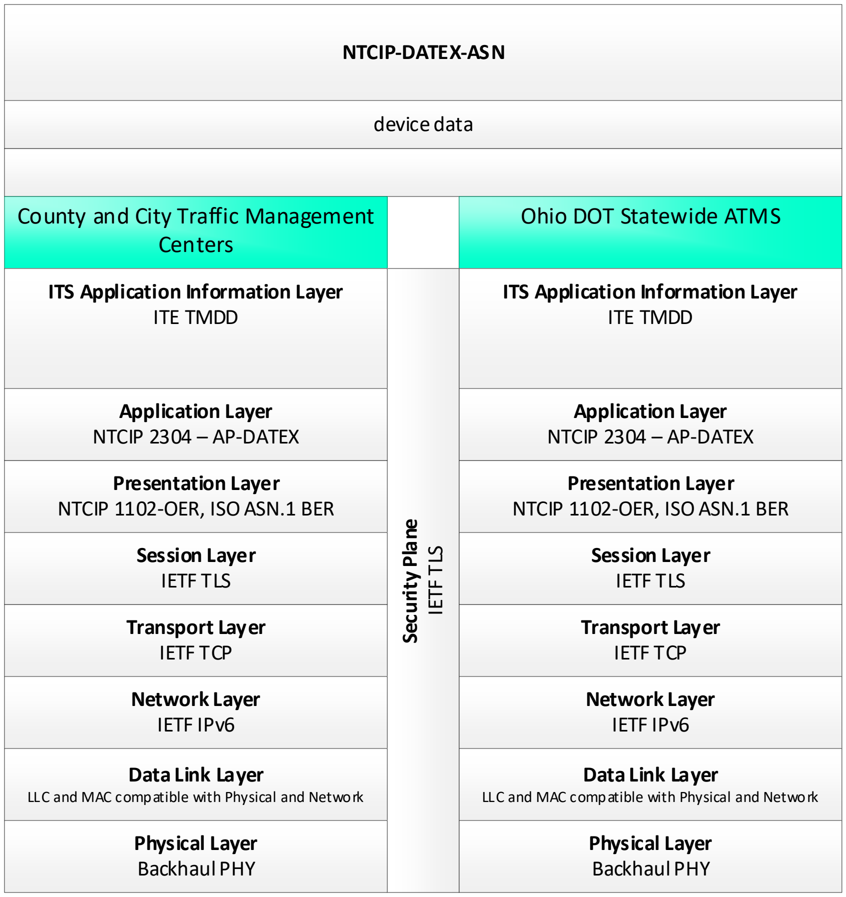
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 91 F: device control request / S: Ohio DOT Statewide ATMS -> D: Ohio Turnpike Central Dispatch / P: NTCIP-DATEX



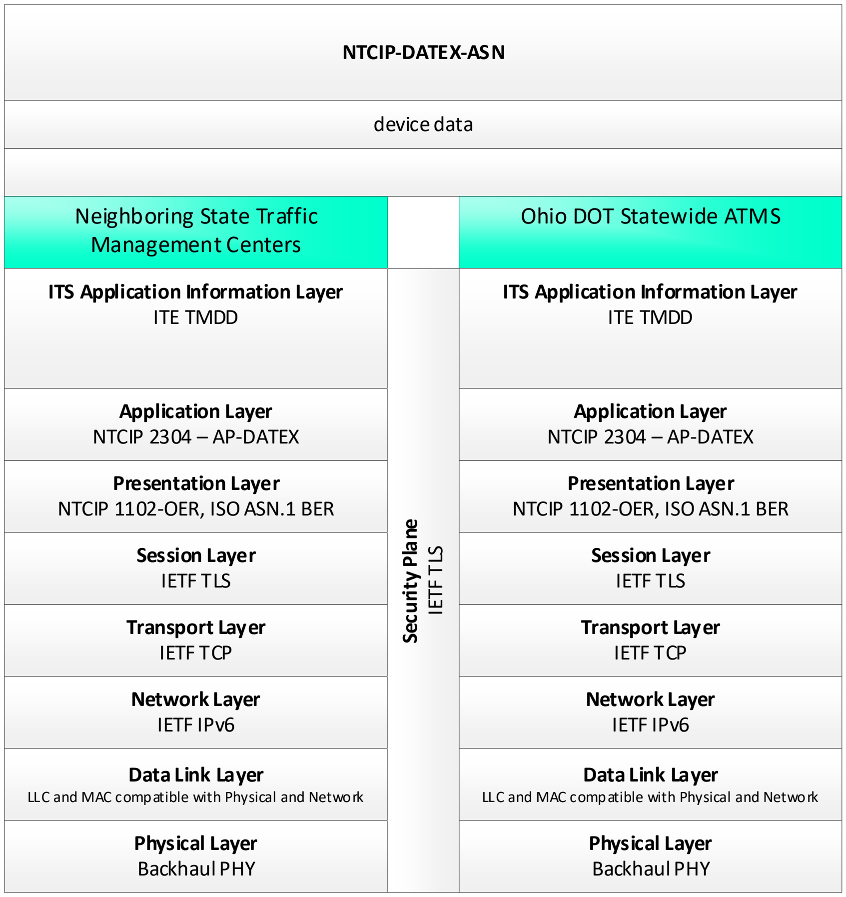
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 92 F: device control request / S: Ohio Turnpike Central Dispatch -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



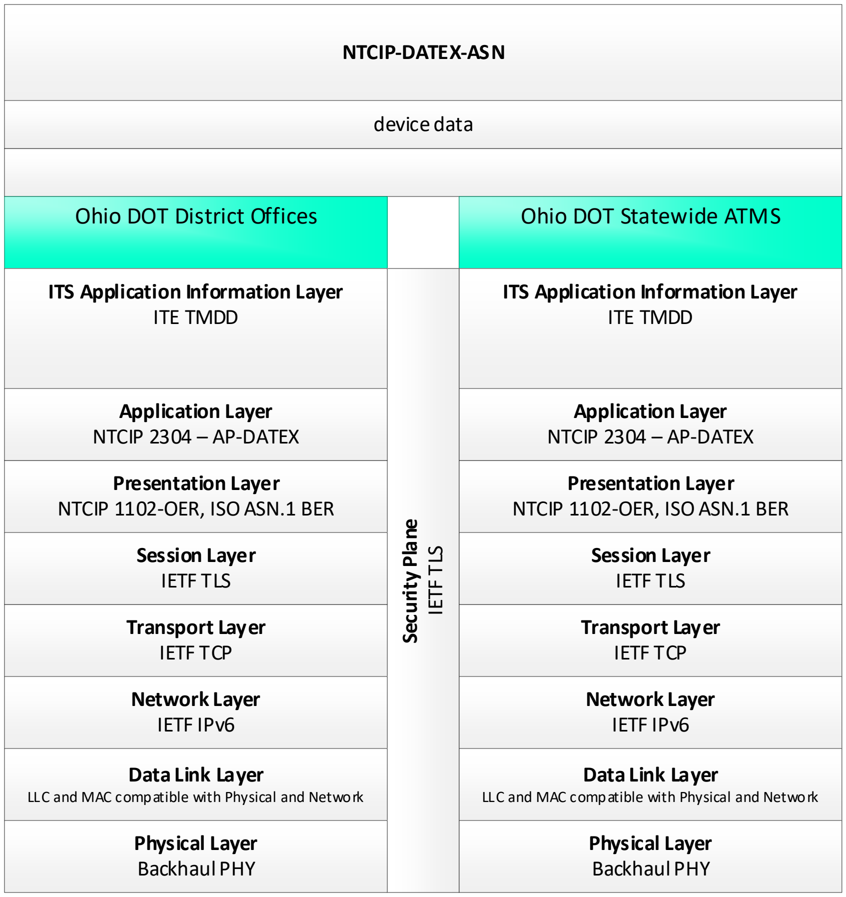
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 93 F: device data / S: County and City TMCs -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



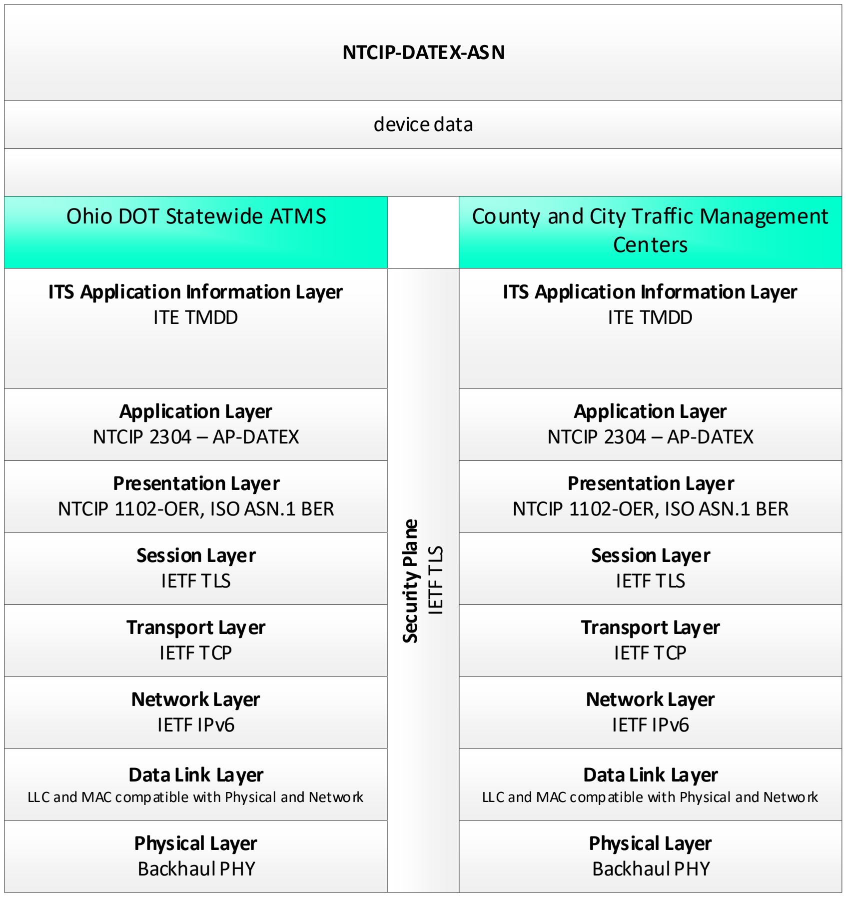
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 94 F: device data / S: Neighboring State TMCs -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



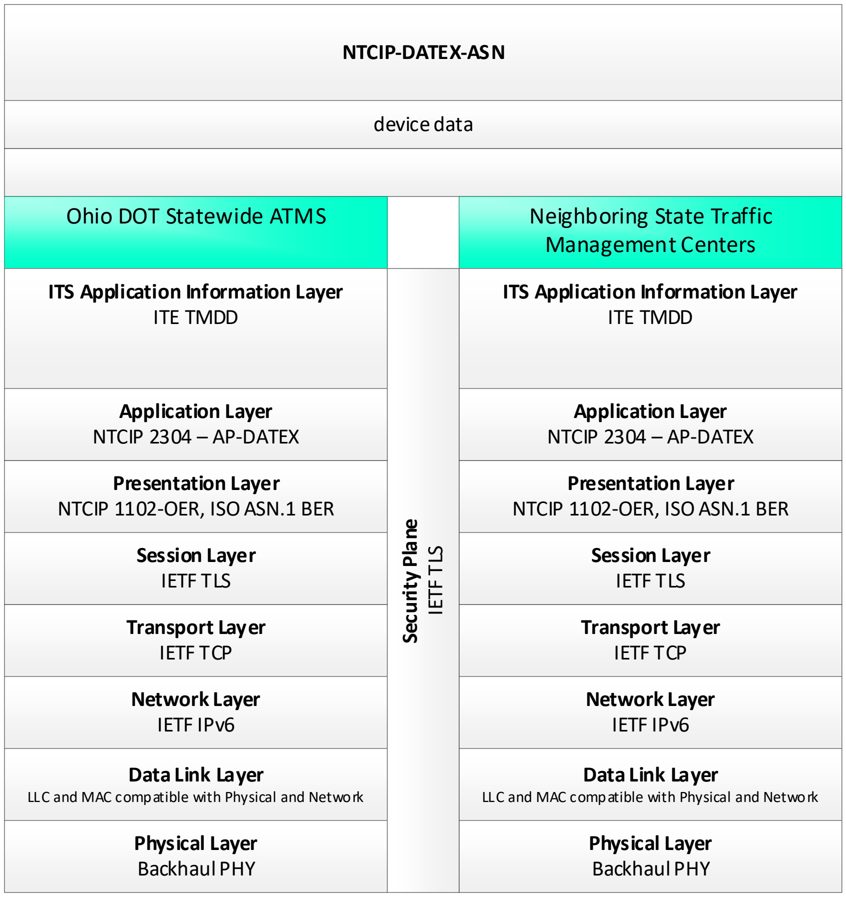
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 95 F: device data / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



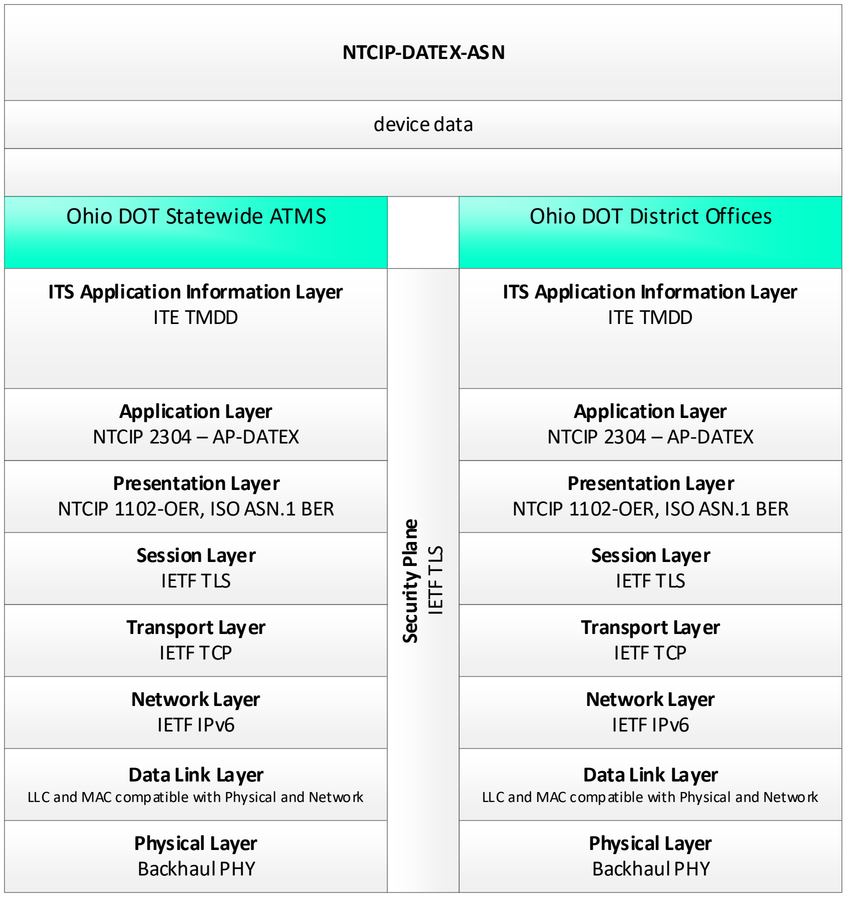
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 96 F: device data Ohio DOT Statewide ATMS -> D: County and City TMCs / P: NTCIP-DATEX



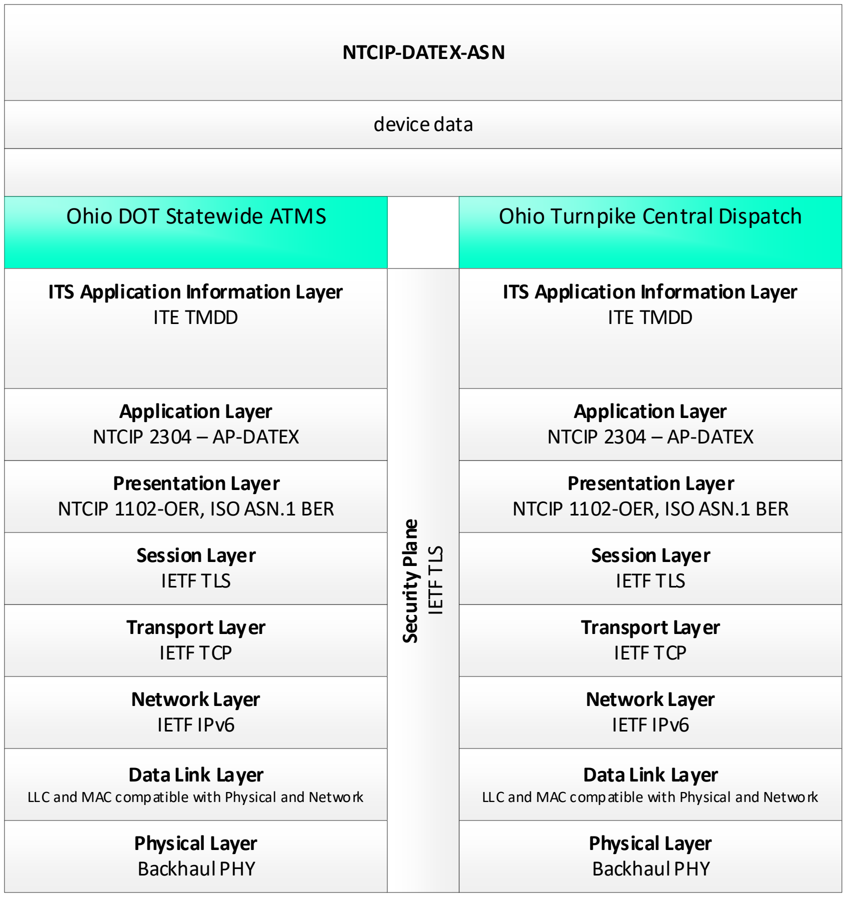
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 97 F: device data Ohio DOT Statewide ATMS -> D: Neighboring State TMCs / P: NTCIP-DATEX



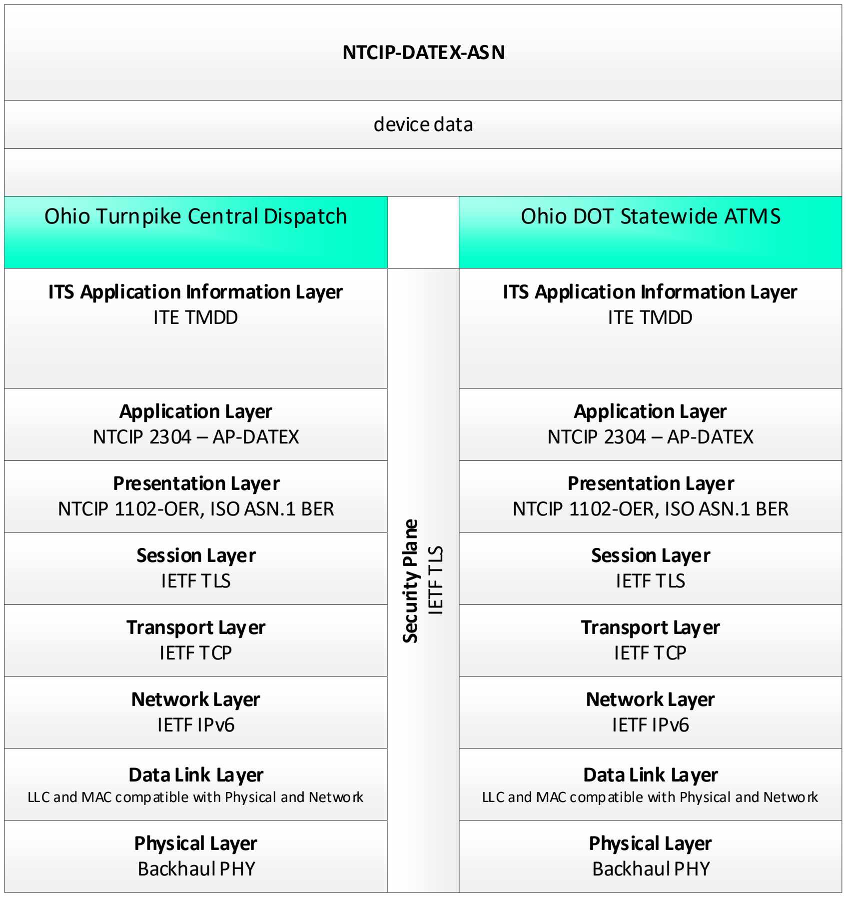
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 98 F: device data Ohio DOT Statewide ATMS -> D: Ohio DOT District Offices / P: NTCIP-DATEX



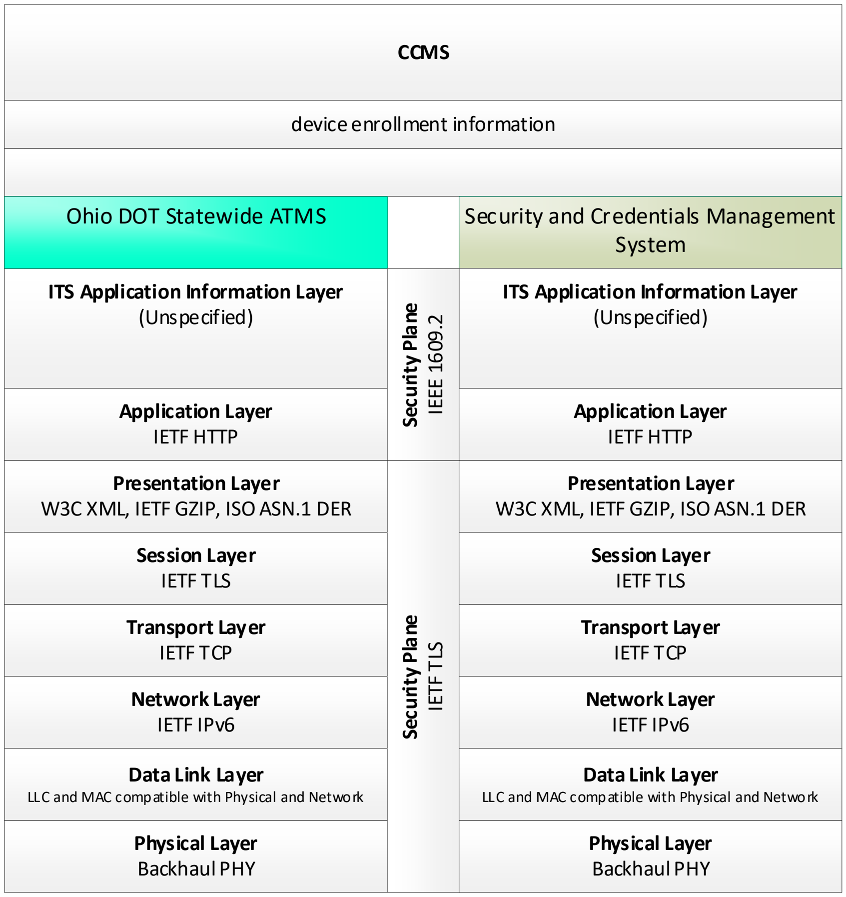
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 99 F: device data / S: Ohio DOT Statewide ATMS -> D: Ohio Turnpike Central Dispatch / P: NTCIP-DATEX



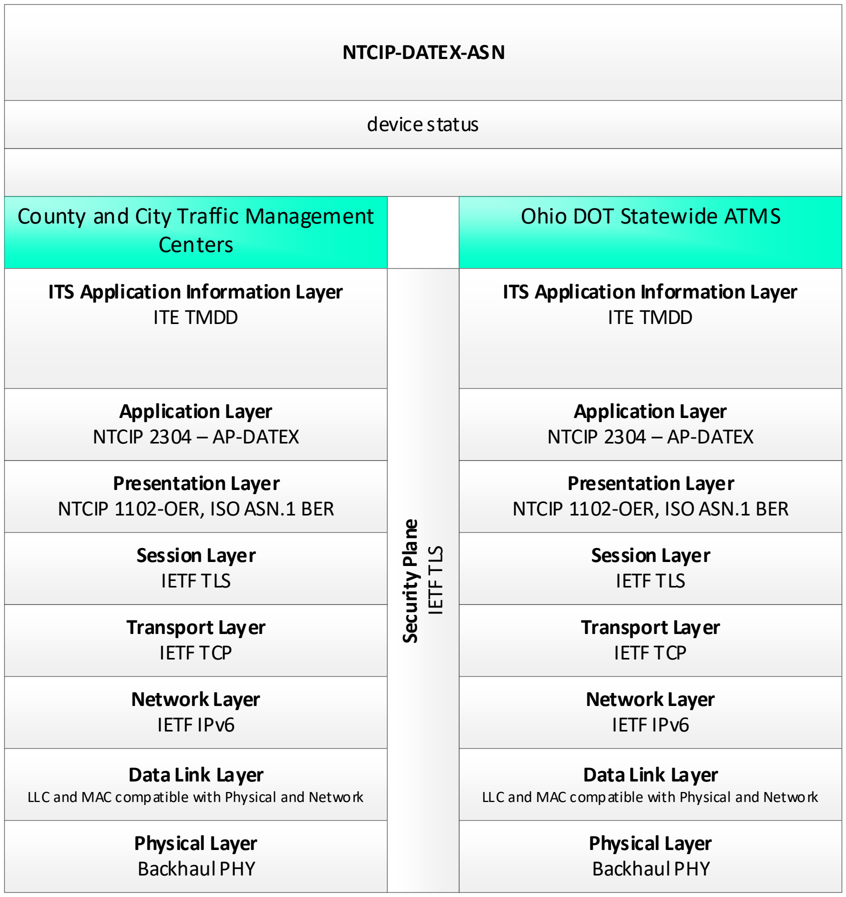
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 100 F: device data / S: Ohio Turnpike Central Dispatch -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



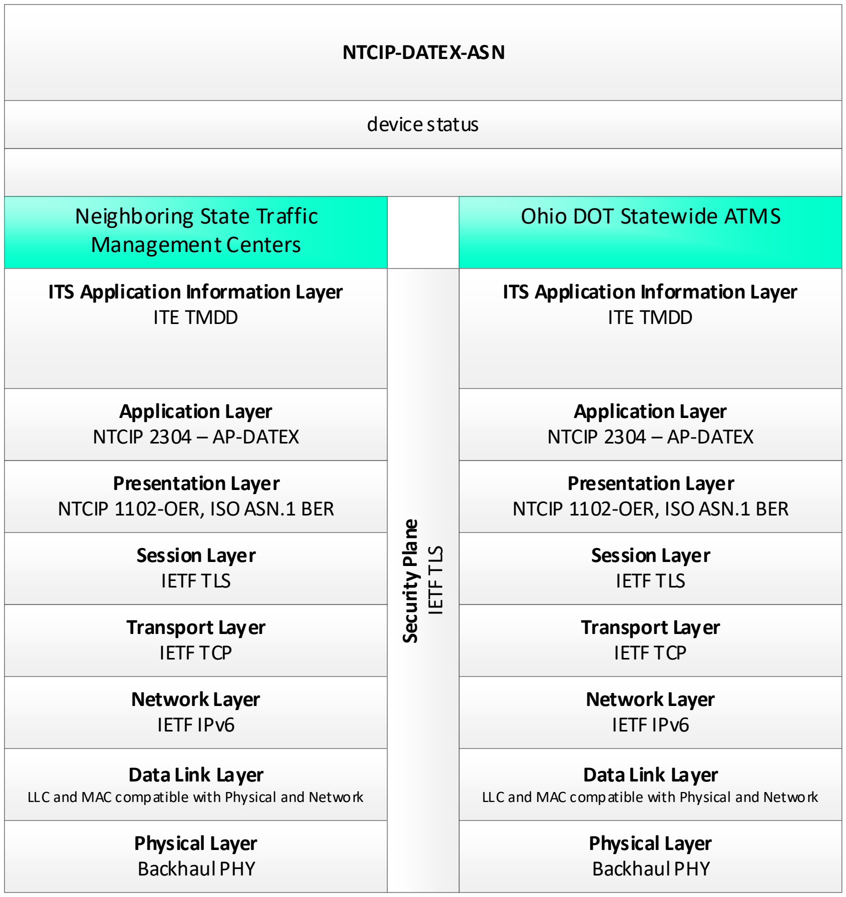
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 101 F: device enrollment information / S: Ohio DOT Statewide ATMS -> D: Security and Credentials Management System / P: CCMS



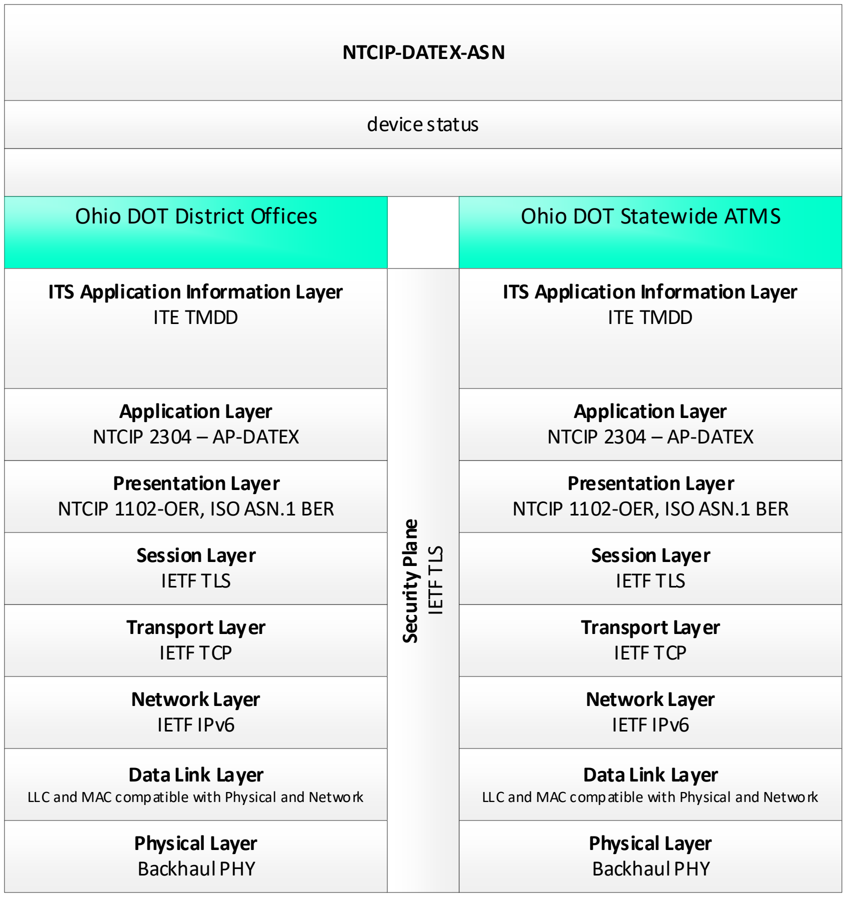
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 102 F: device status / S: County and City Traffic Management Centers -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



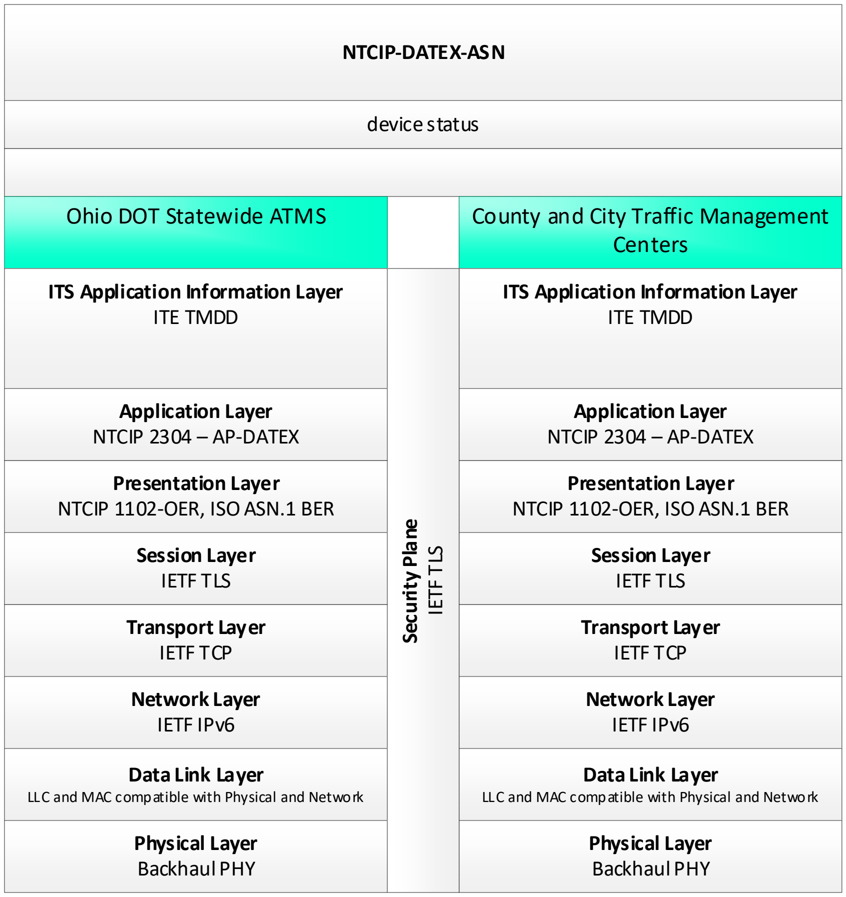
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 103 F: device status / S: Neighboring State Traffic Management Centers -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



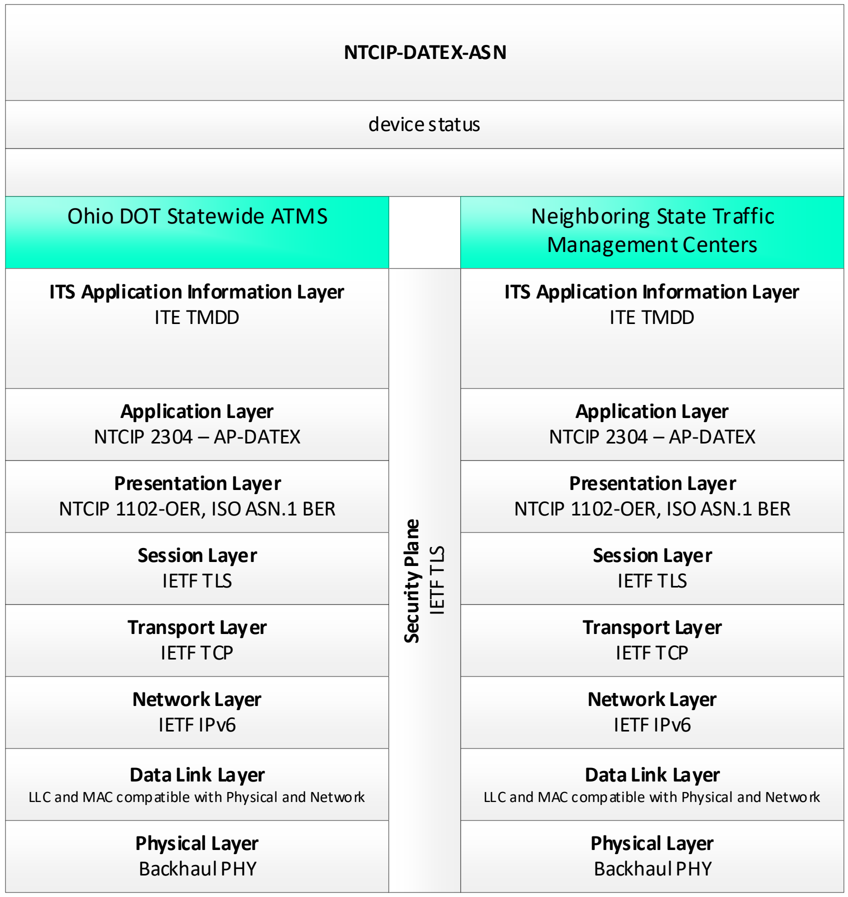
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 104 F: device status / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



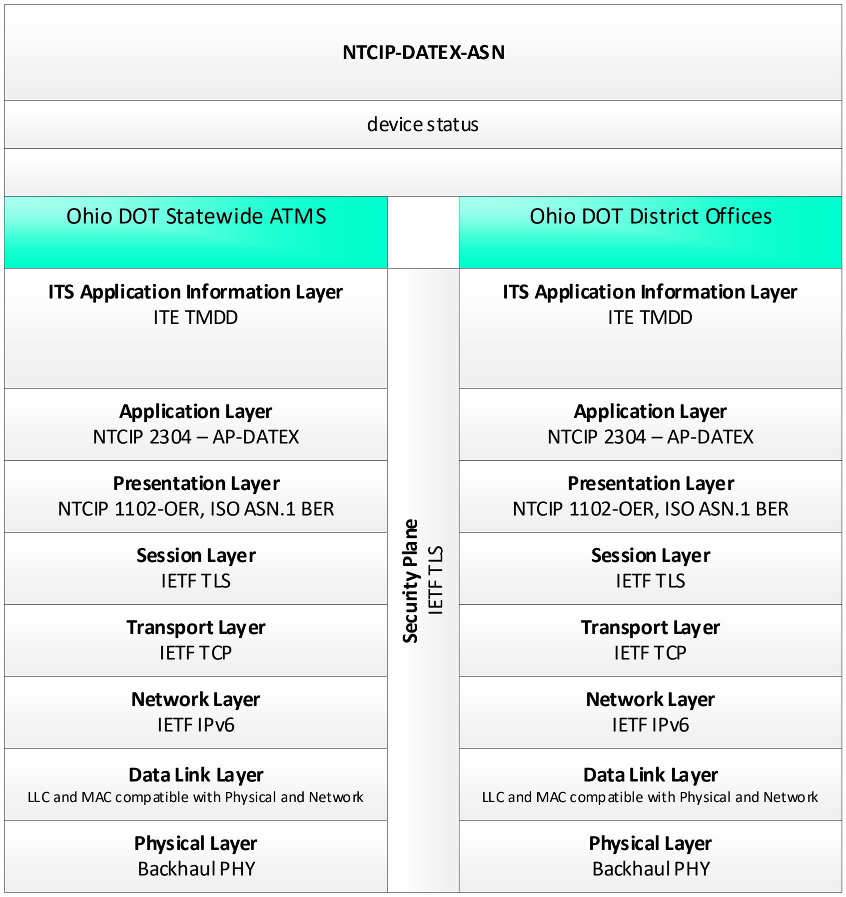
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 105 F: device status / S: Ohio DOT Statewide ATMS -> D: County and City Traffic Management Centers / P: NTCIP-DATEX



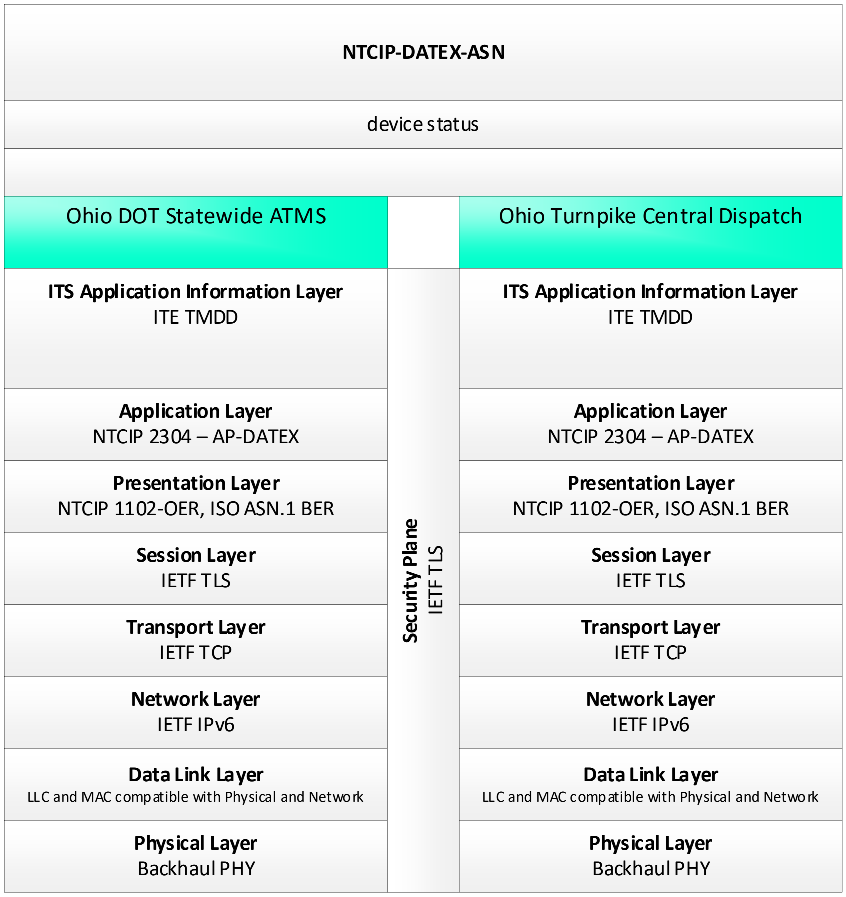
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 106 F: device status / S: Ohio DOT Statewide ATMS -> D: Neighboring State Traffic Management Centers / P: NTCIP-DATEX



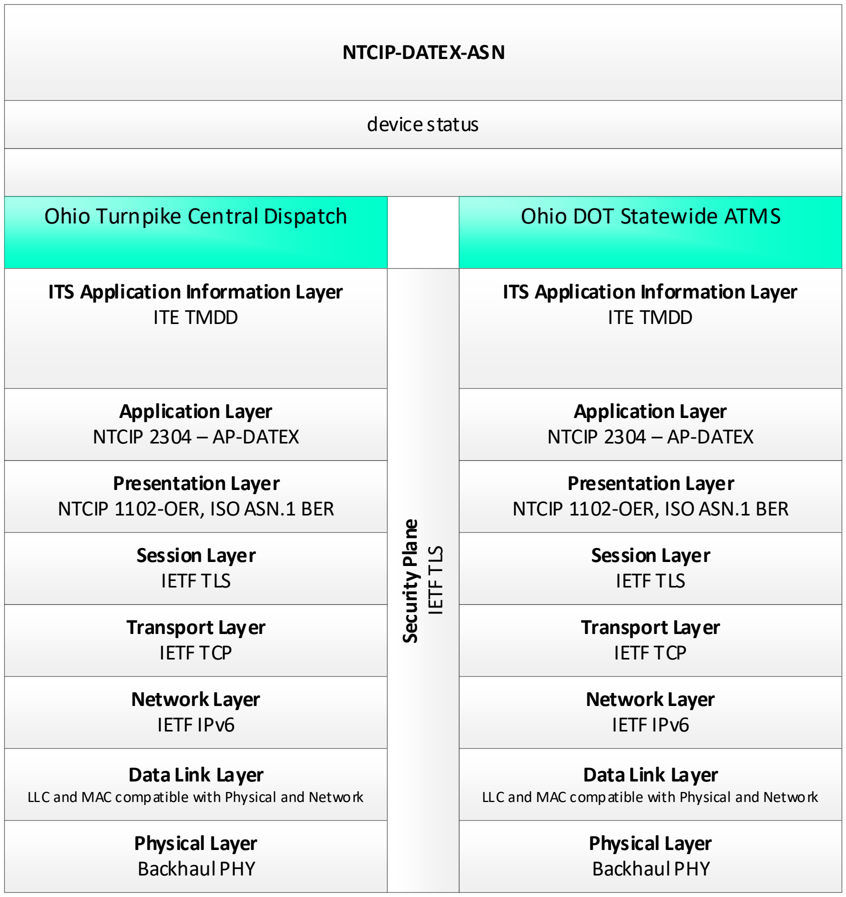
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 107 F: device status / S: Ohio DOT Statewide ATMS -> D: Ohio DOT District Offices / P: NTCIP-DATEX



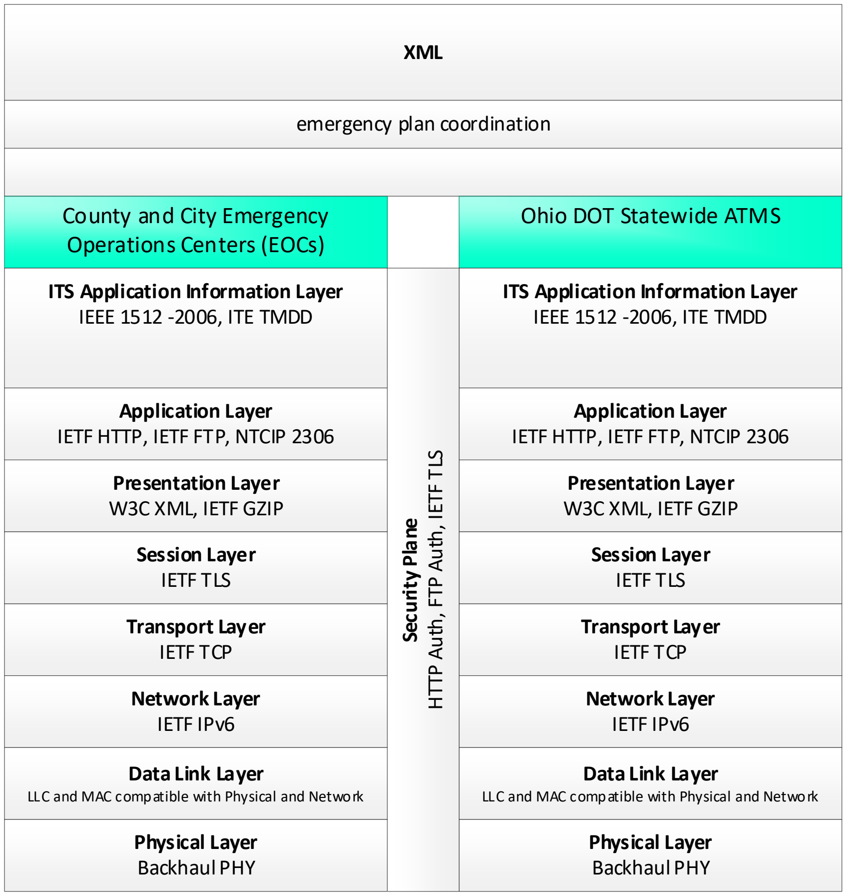
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 108 F: device status / S: Ohio DOT Statewide ATMS -> D: Ohio Turnpike Central Dispatch / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

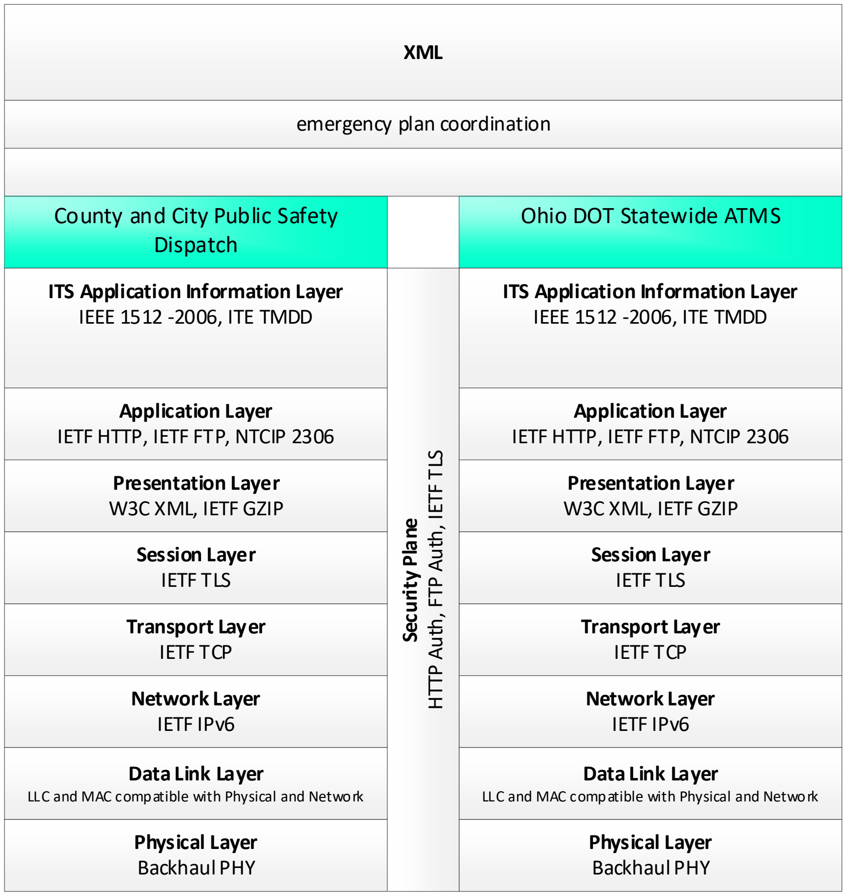
Figure 109 F: device status / S: Ohio Turnpike Central Dispatch -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- IEEE 1512 supports emergency response plans, but the focus is on incidents.

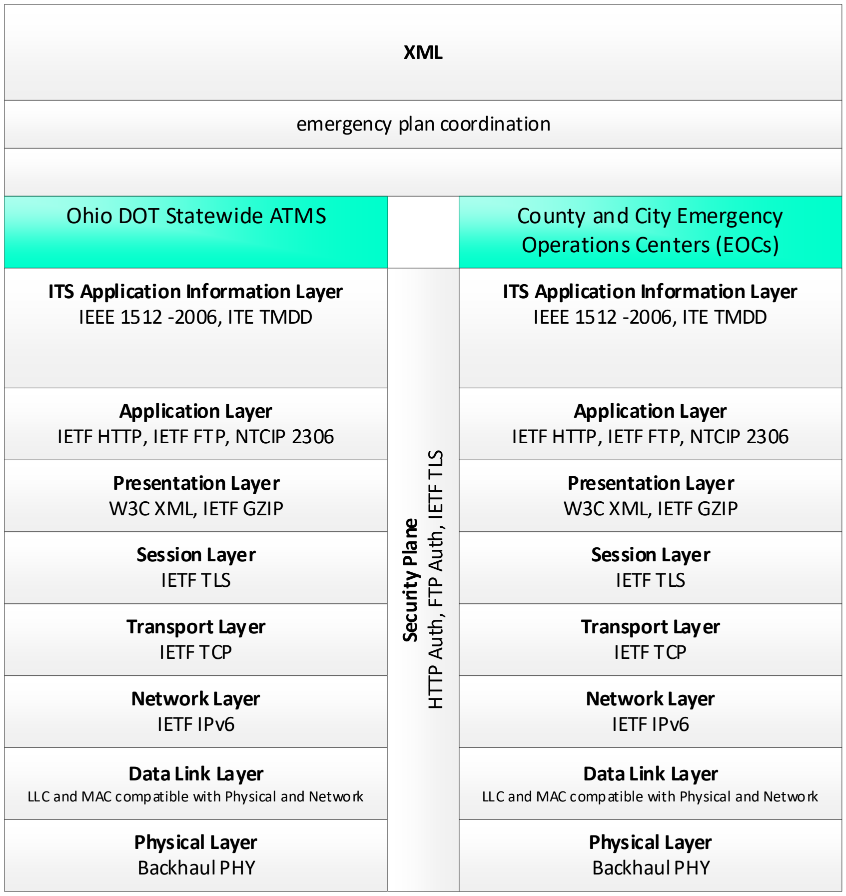
Figure 110 F: emergency plan coordination / S: County and City Emergency Operations Centers (EOCs) -> D: Ohio DOT Statewide ATMS / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- IEEE 1512 supports emergency response plans, but the focus is on incidents.

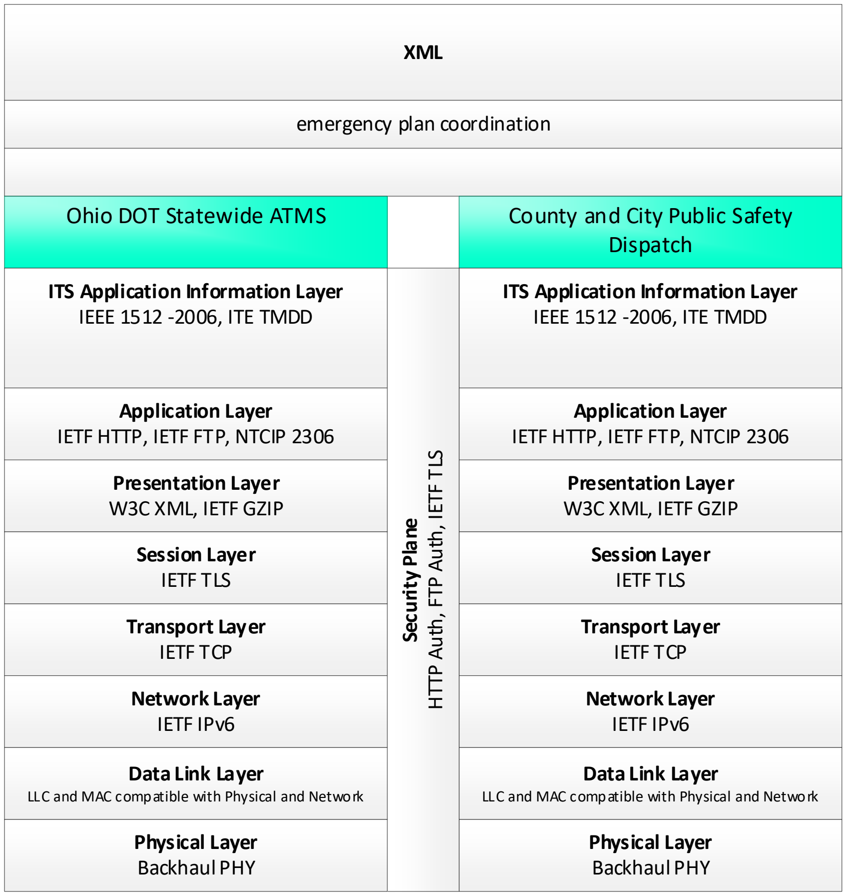
Figure 111 F: emergency plan coordination / S: County and City Public Safety Dispatch -> D: Ohio DOT Statewide ATMS / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- IEEE 1512 supports emergency response plans, but the focus is on incidents.

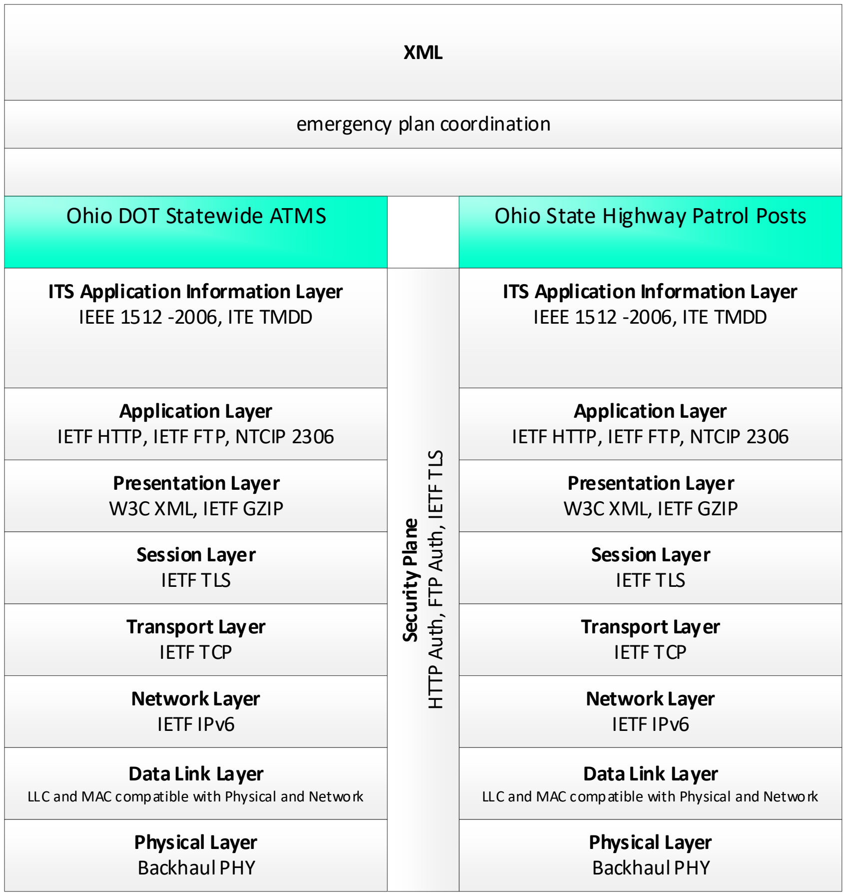
Figure 112 F: emergency plan coordination / S: Ohio DOT Statewide ATMS -> D: County and City Emergency Operations Centers (EOCs) / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- IEEE 1512 supports emergency response plans, but the focus is on incidents.

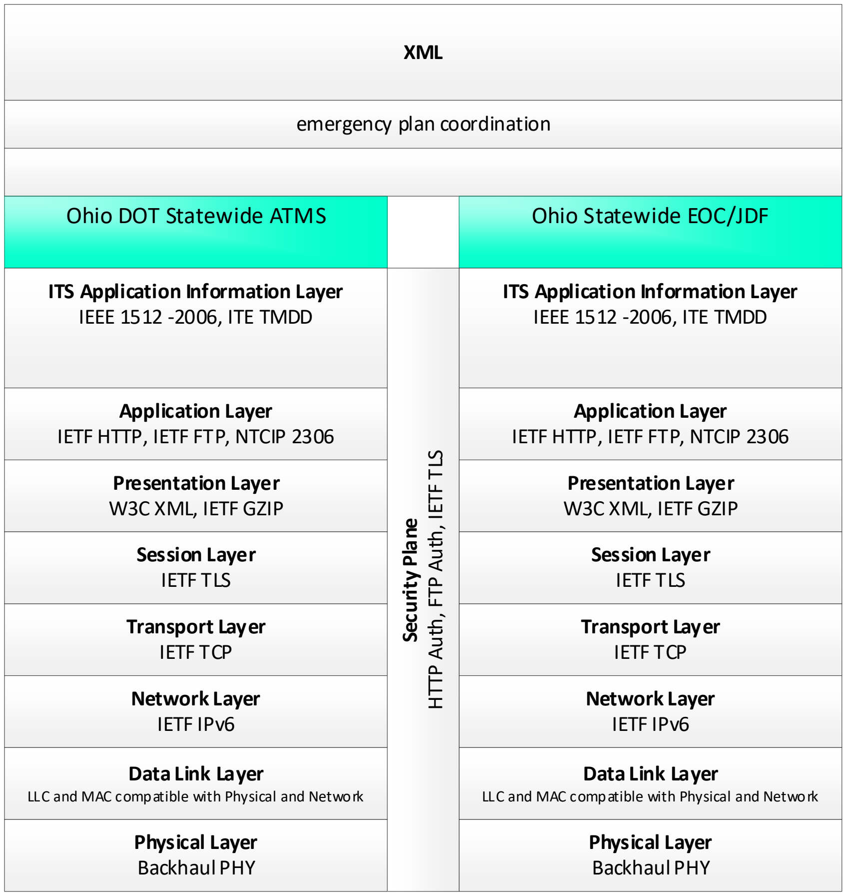
Figure 113 F: emergency plan coordination / S: Ohio DOT Statewide ATMS -> D: County and City Public Safety Dispatch / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- IEEE 1512 supports emergency response plans, but the focus is on incidents.

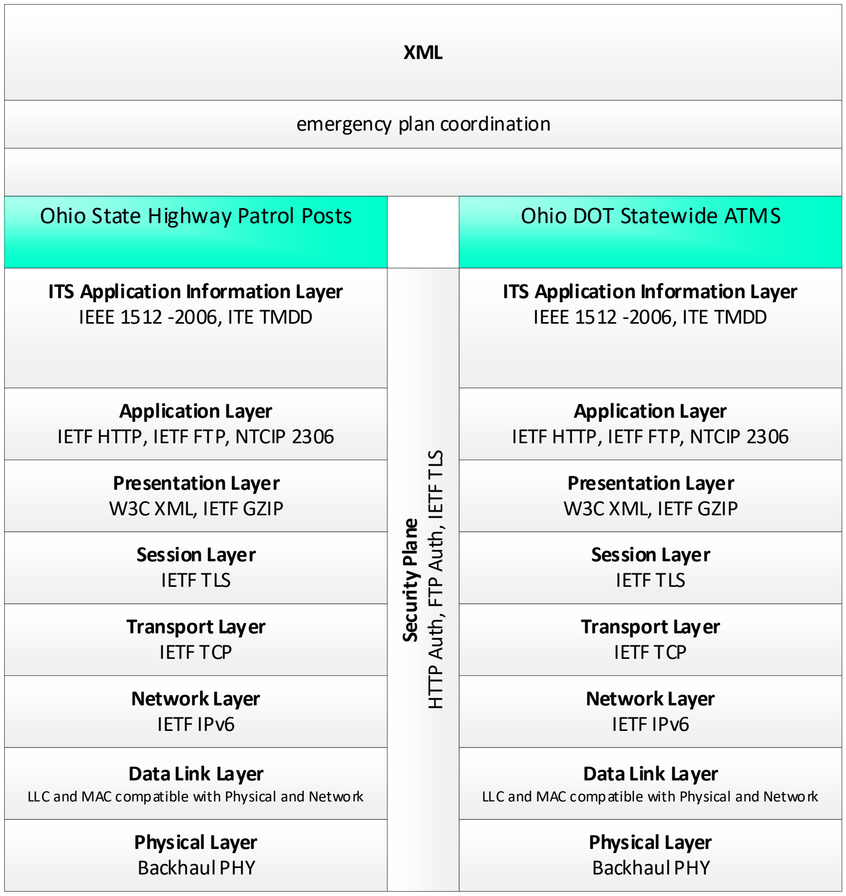
Figure 114 F: emergency plan coordination / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol Posts / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- IEEE 1512 supports emergency response plans, but the focus is on incidents.

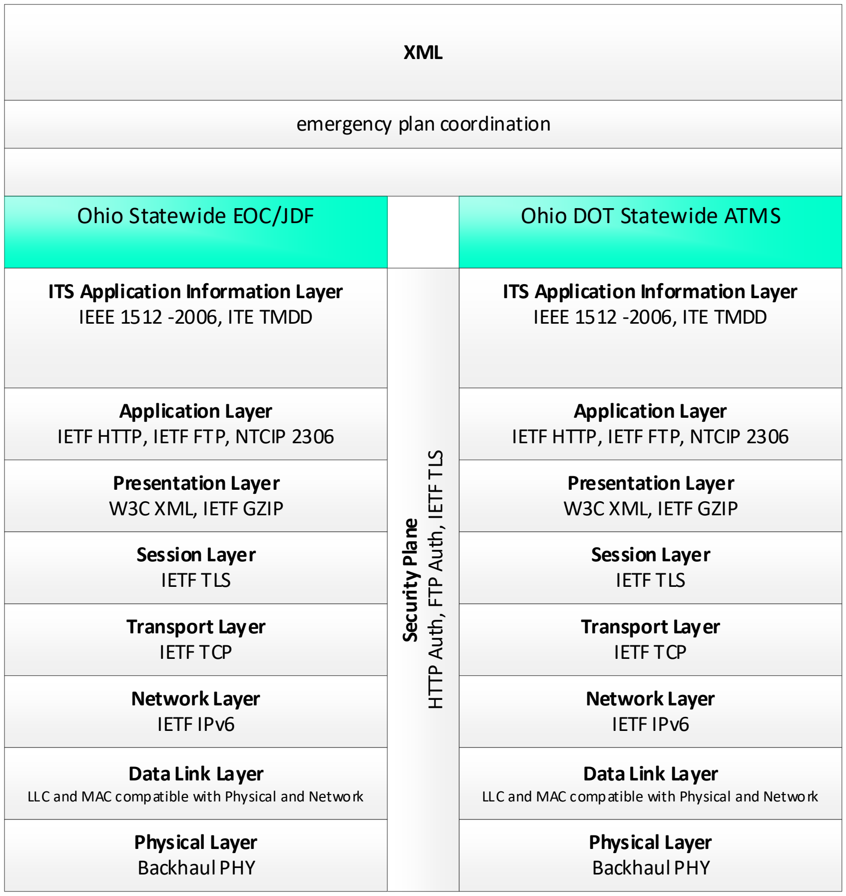
Figure 115 F: emergency plan coordination / S: Ohio DOT Statewide ATMS -> D: Ohio Statewide EOC/JDF / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- IEEE 1512 supports emergency response plans, but the focus is on incidents.

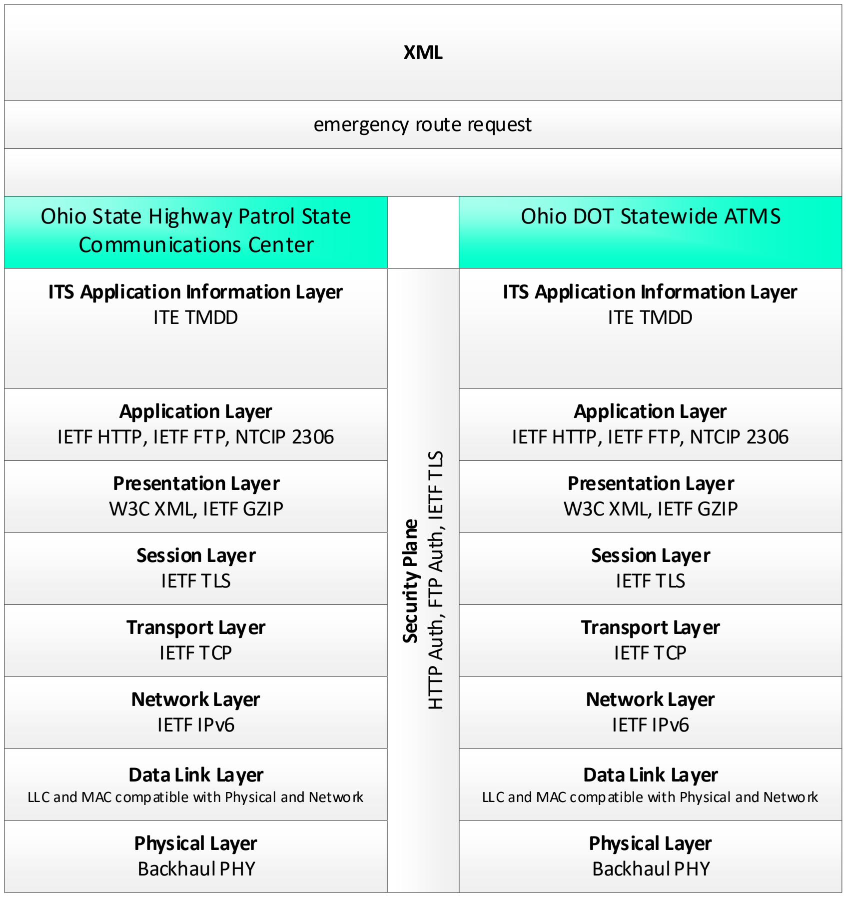
Figure 116 F: emergency plan coordination / S: Ohio State Highway Patrol Posts -> D: Ohio DOT Statewide ATMS / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

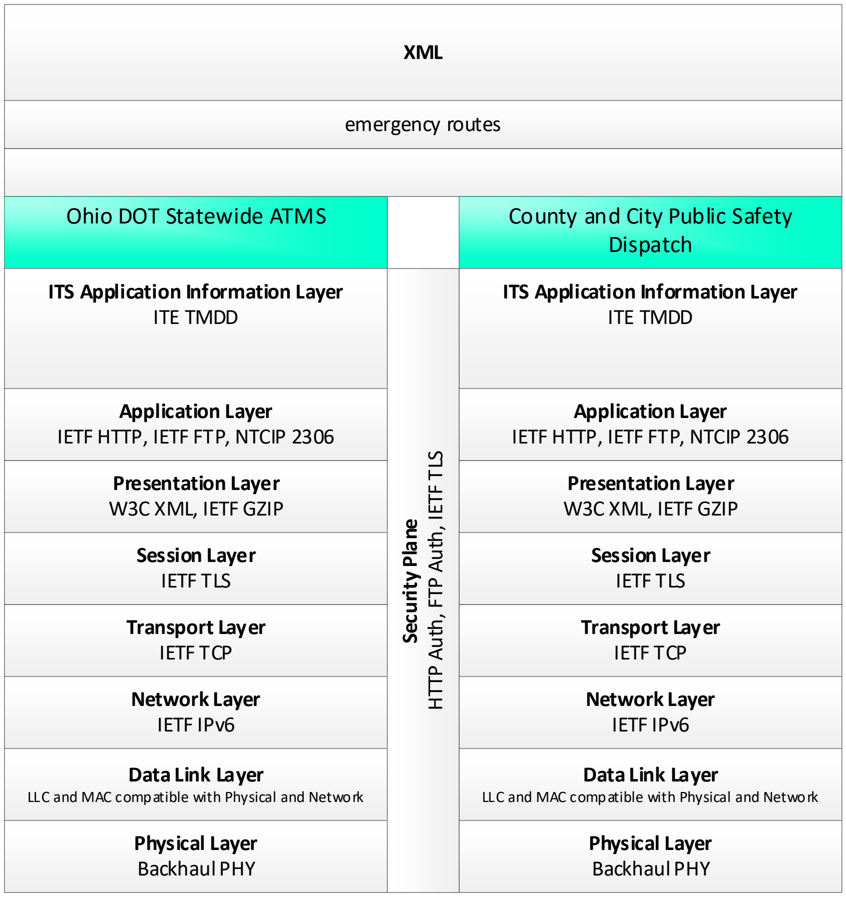
** Information Layer Standard(s) -- IEEE 1512 supports emergency response plans, but the focus is on incidents.

Figure 117 F: emergency plan coordination / S: Ohio Statewide EOC/JDF -> D: Ohio DOT Statewide ATMS / P: XML



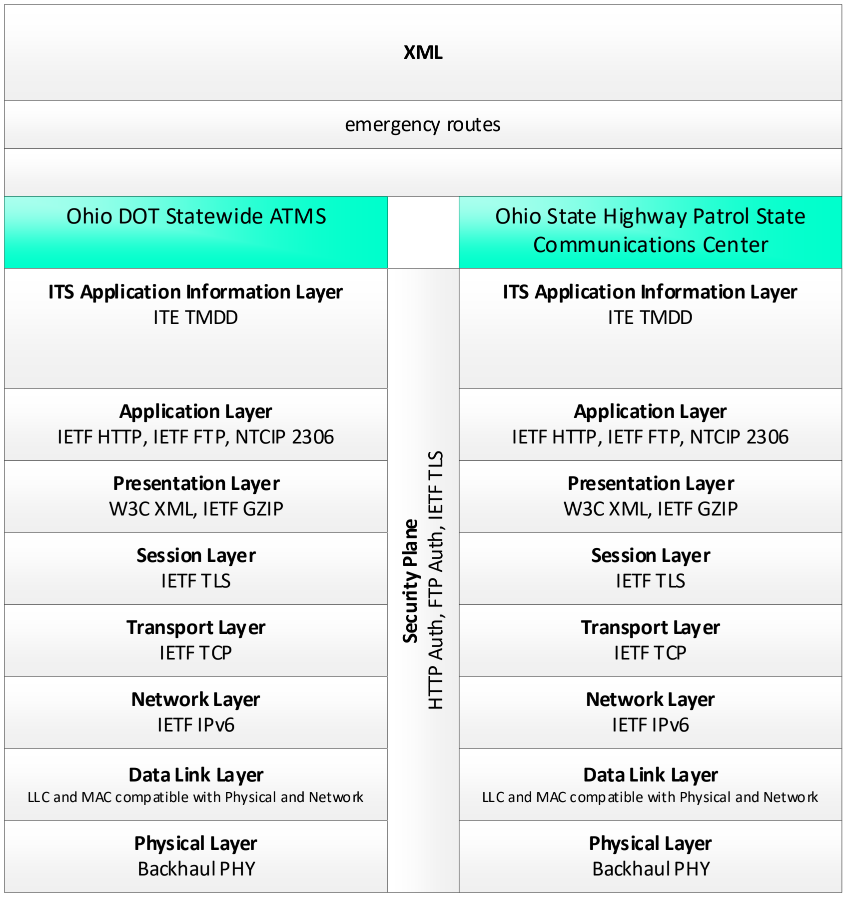
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 118 F: emergency route request / S: Ohio State Highway Patrol State Communications Center -> D: Ohio DOT Statewide ATMS / P: XML



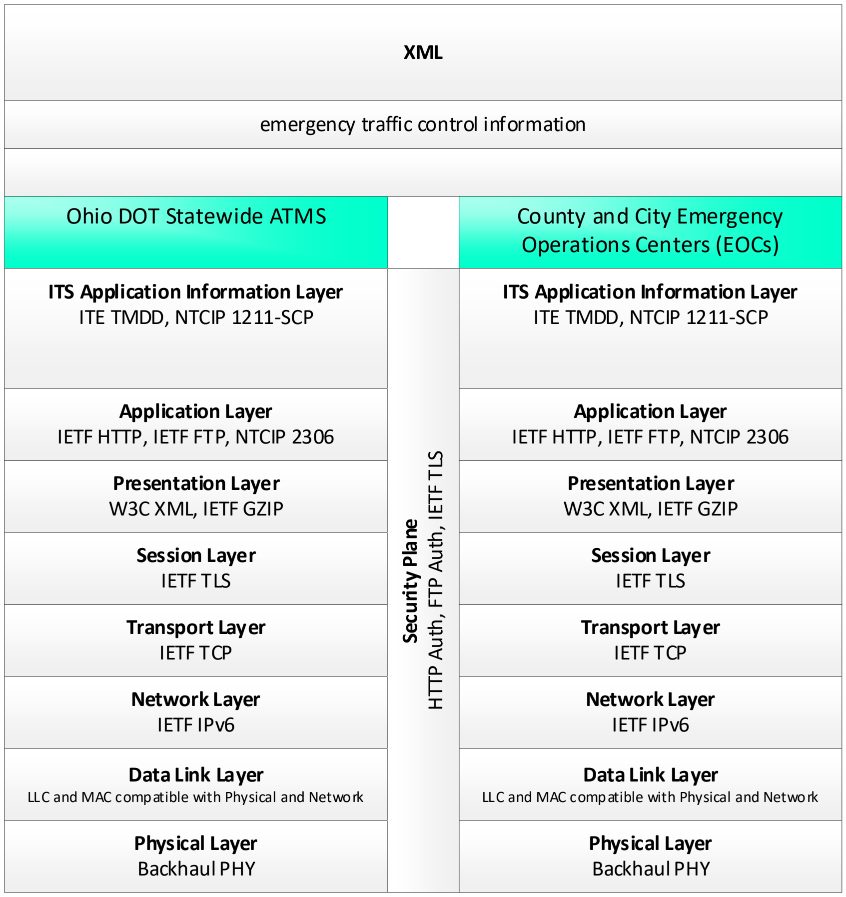
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 119 F: emergency routes / S: Ohio DOT Statewide ATMS -> D: County and City Public Safety Dispatch / P: XML



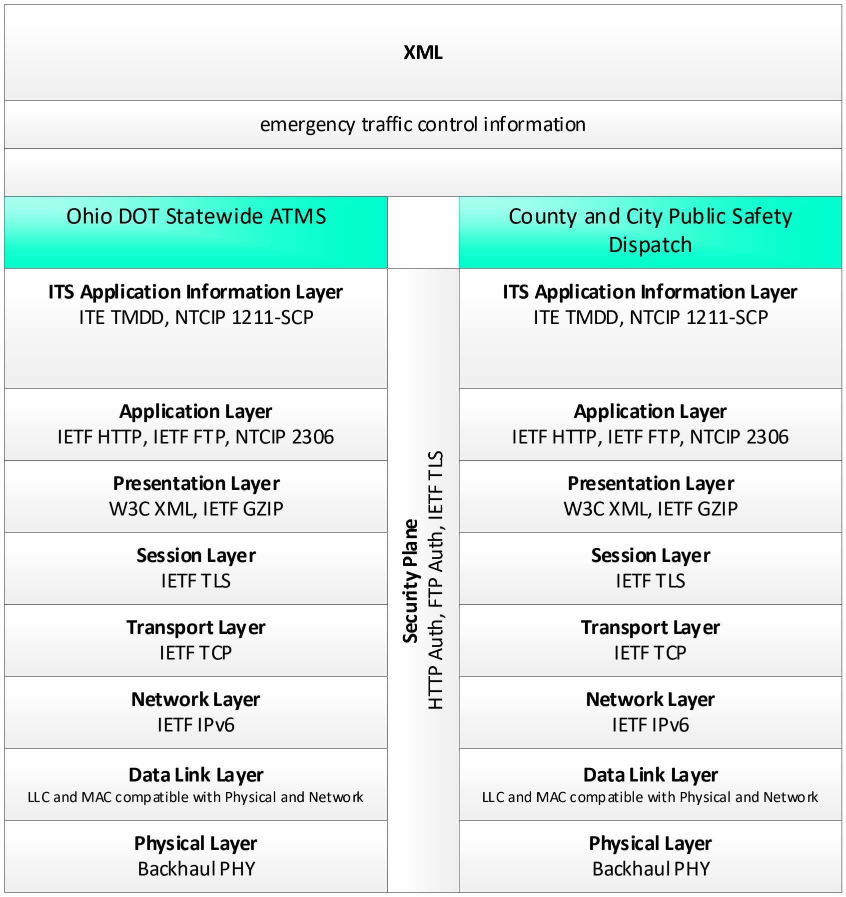
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 120 F: emergency routes / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol State Communications Center / P: XML



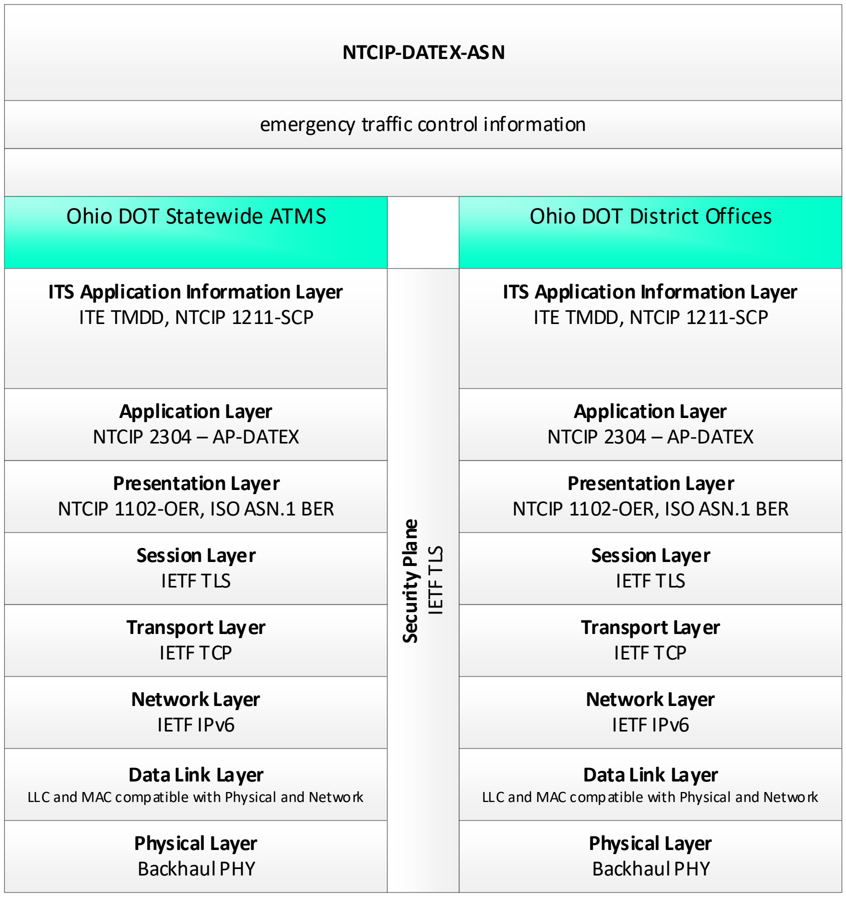
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 121 F: emergency traffic control information / S: Ohio DOT Statewide ATMS -> D: County and City Emergency Operations Centers (EOCs) / P: XML



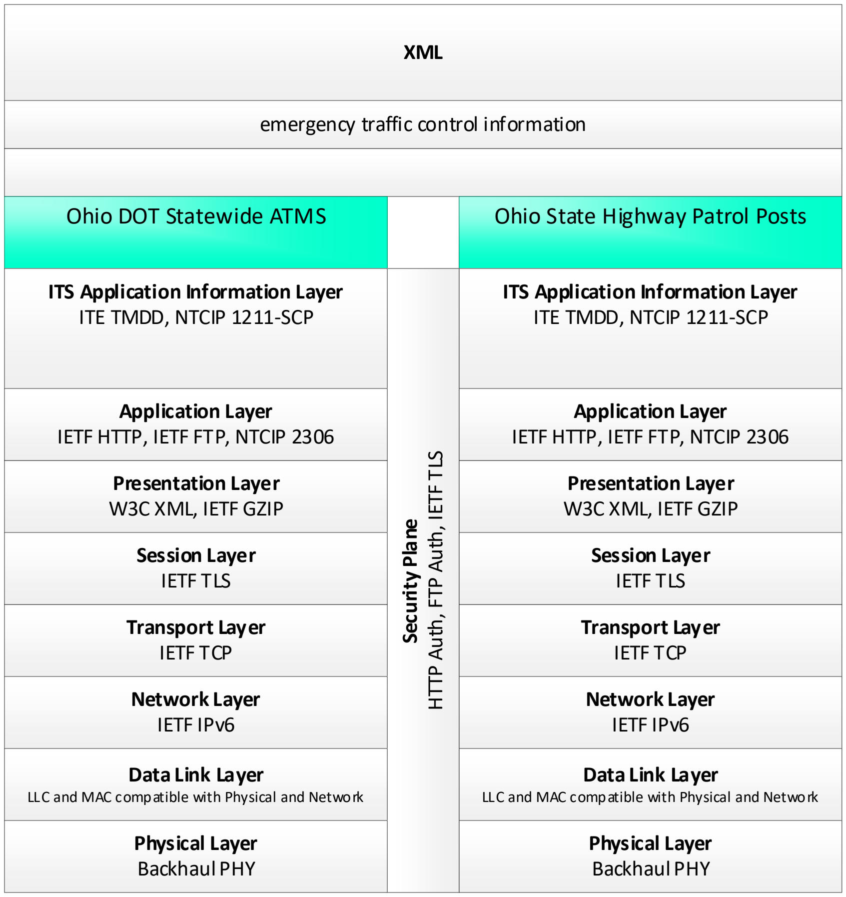
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 122 F: emergency traffic control information / S: Ohio DOT Statewide ATMS -> D: County and City Public Safety Dispatch / P: XML



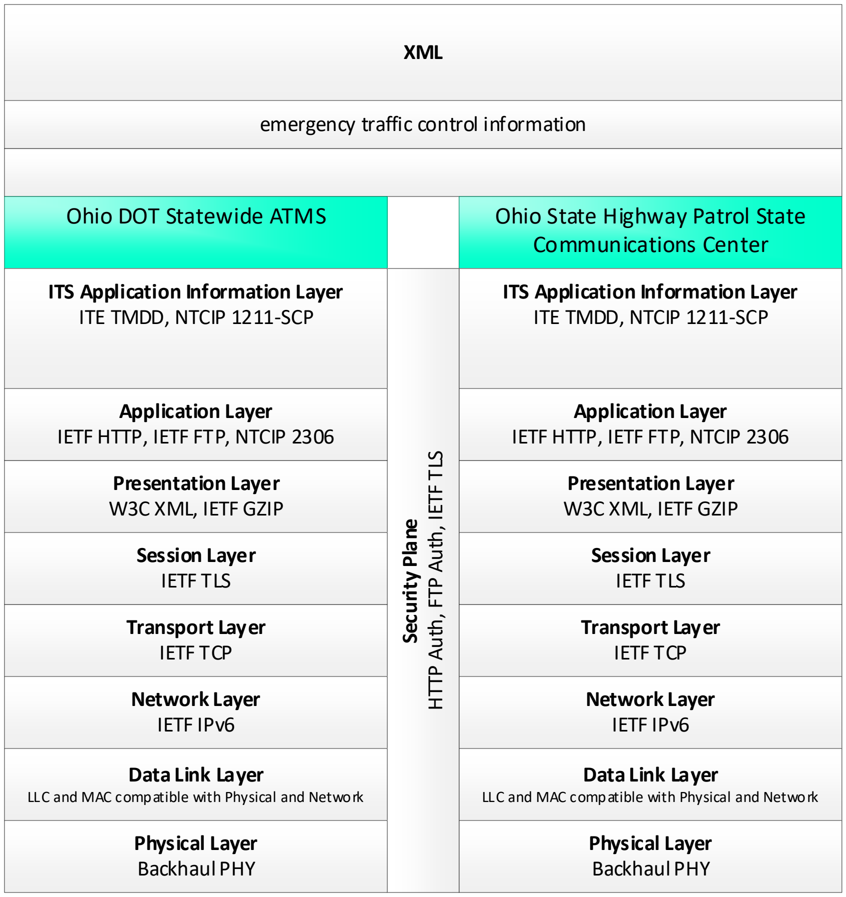
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 123 F: emergency traffic control information / S: Ohio DOT Statewide ATMS -> D: Ohio DOT District Offices / P: NTCIP-DATEX



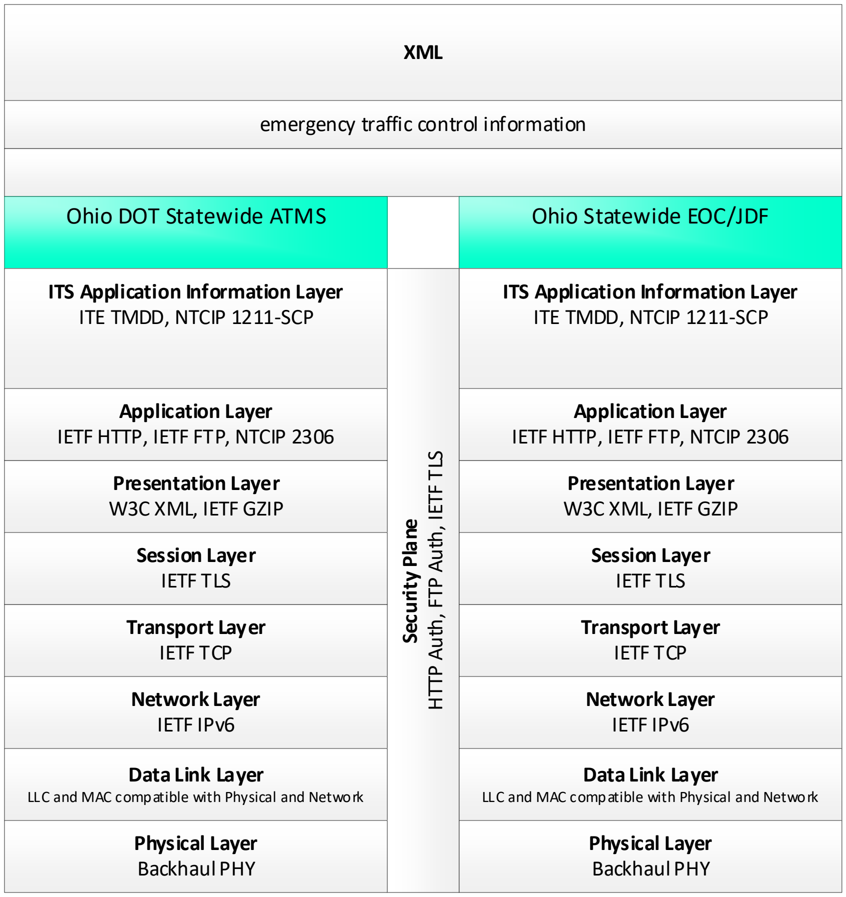
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 124 F: emergency traffic control information / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol Posts / P: XML



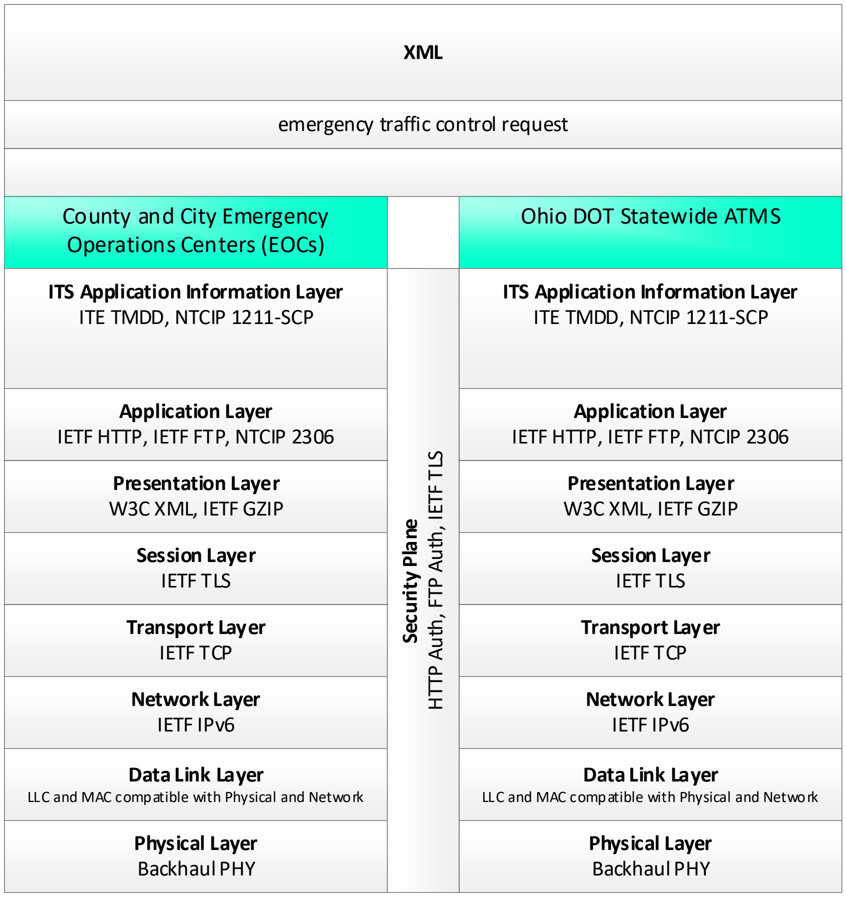
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 125 F: emergency traffic control information / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol State Communications Center / P: XML



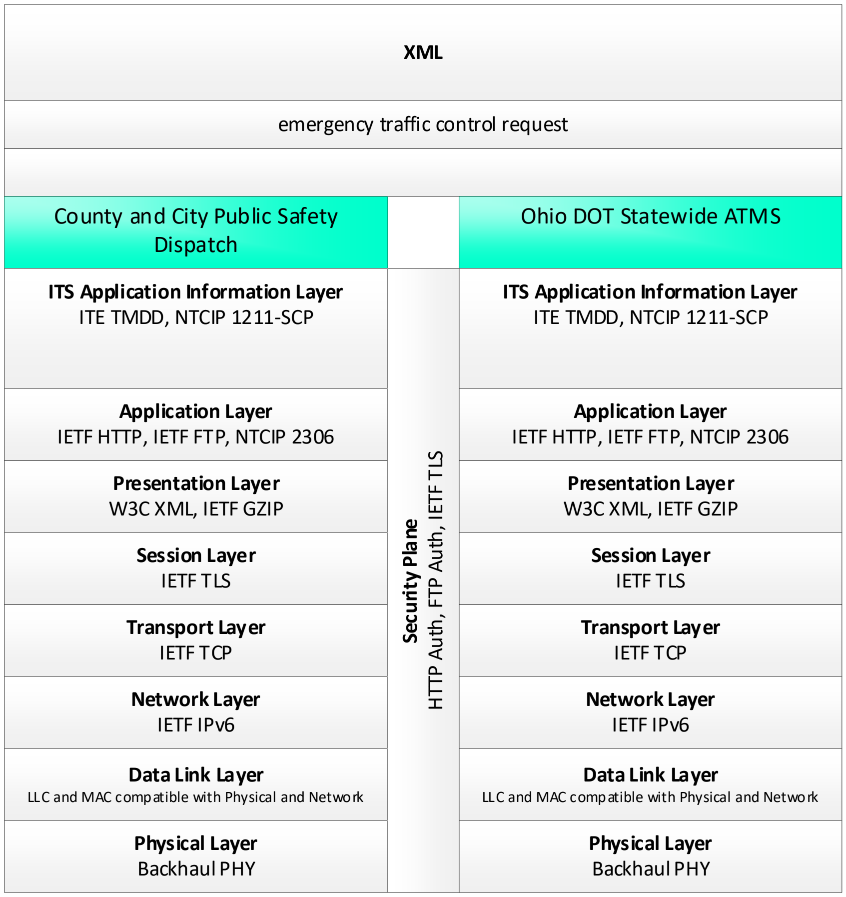
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 126 F: emergency traffic control information / S: Ohio DOT Statewide ATMS -> D: Ohio Statewide EOC/JDF / P: XML



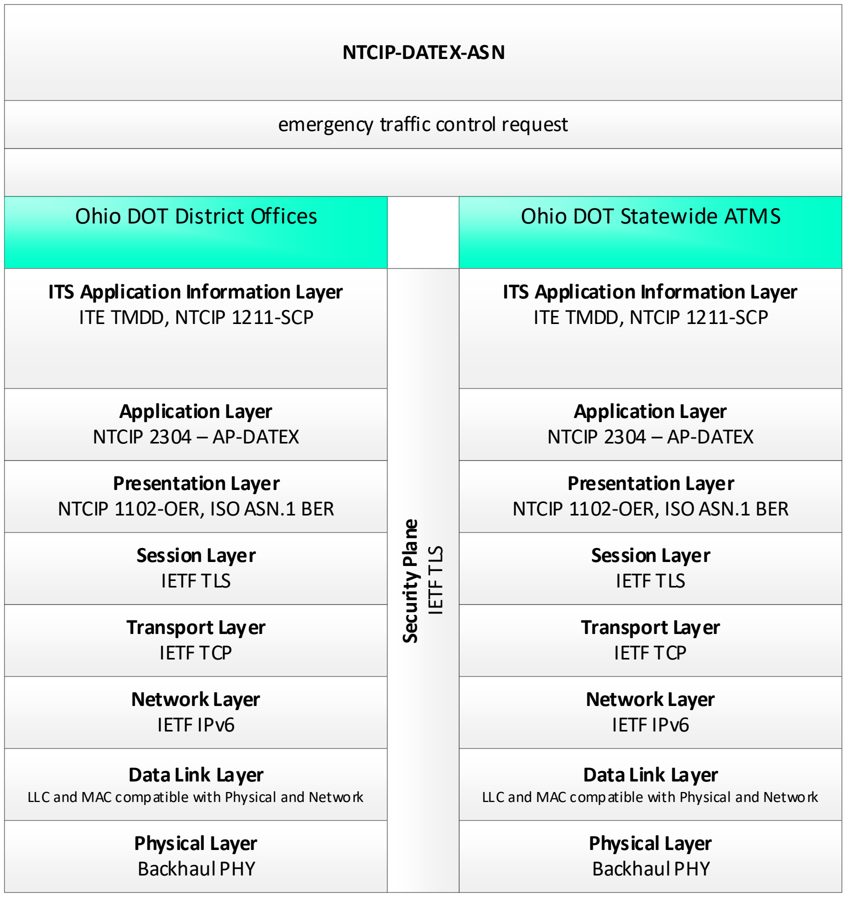
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 127 F: emergency traffic control request / S: County and City Emergency Operations Centers (EOCs) -> D: Ohio DOT Statewide ATMS / P: XML



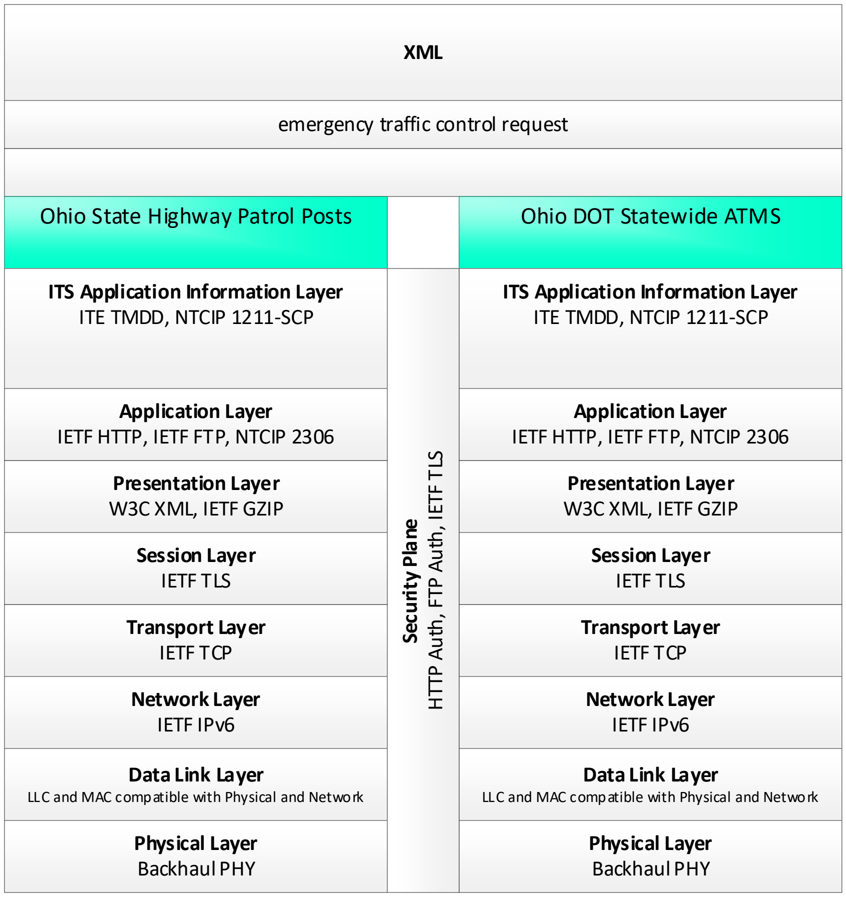
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 128 F: emergency traffic control request / S: County and City Public Safety Dispatch -> D: Ohio DOT Statewide ATMS / P: XML



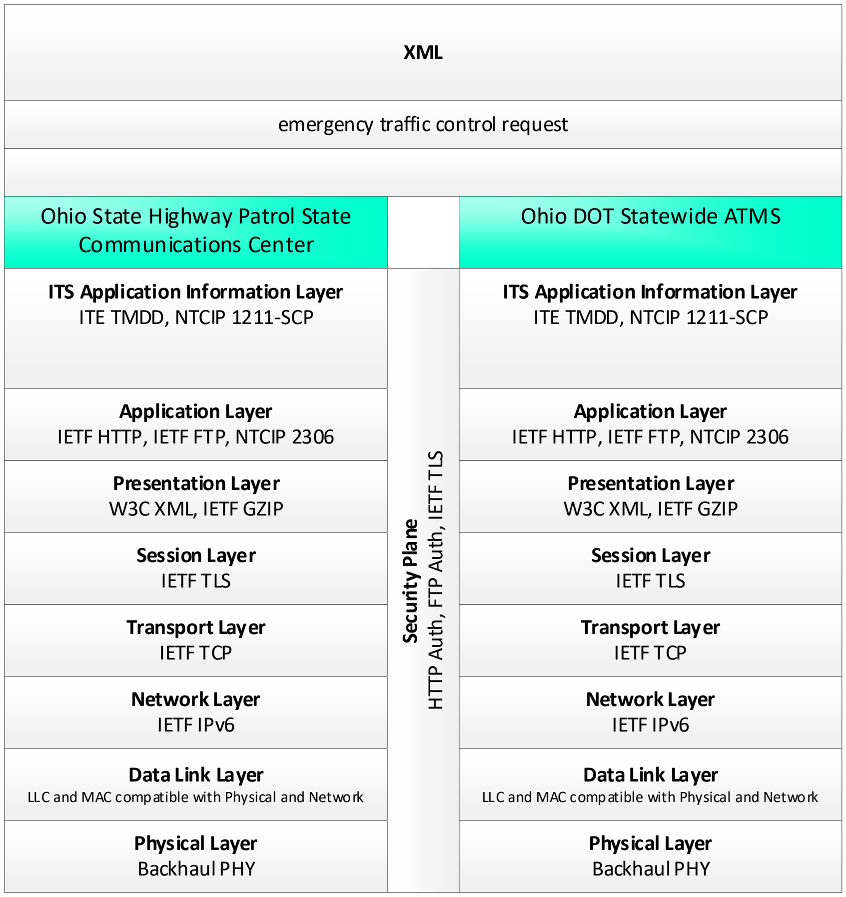
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 129 F: emergency traffic control request / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



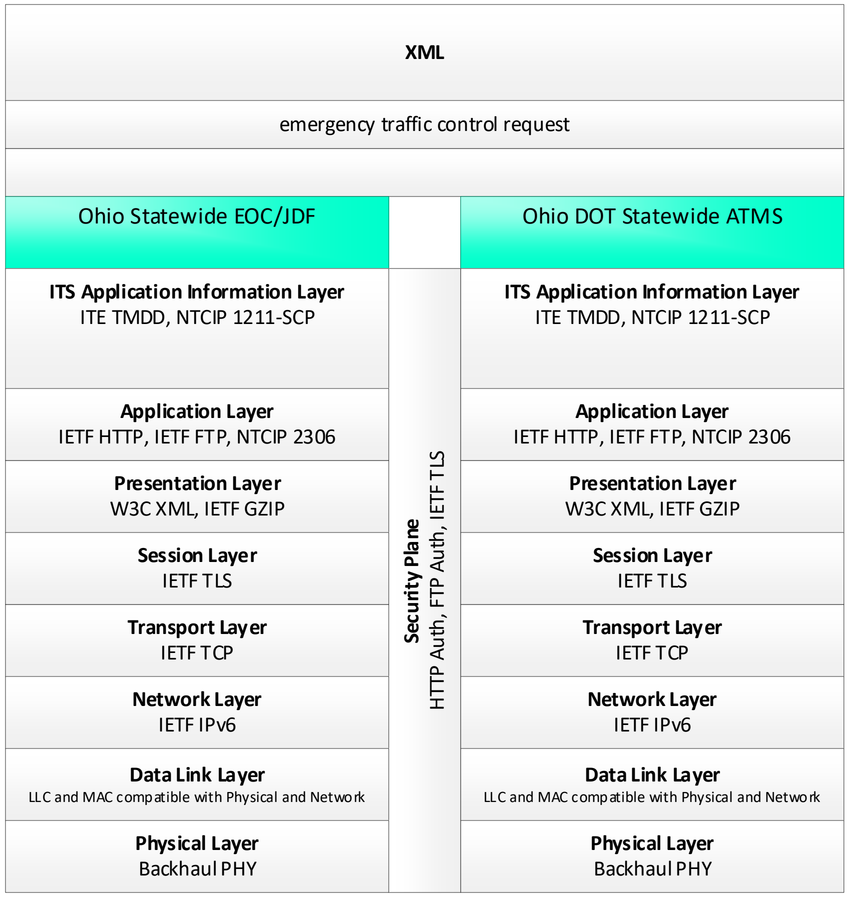
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 130 F: emergency traffic control request / S: Ohio State Highway Patrol Posts -> D: Ohio DOT Statewide ATMS / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 131 F: emergency traffic control request / S: Ohio State Highway Patrol State Communications Center -> D: Ohio DOT Statewide ATMS / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 132 F: emergency traffic control request / S: Ohio Statewide EOC/JDF -> D: Ohio DOT Statewide ATMS / P: XML

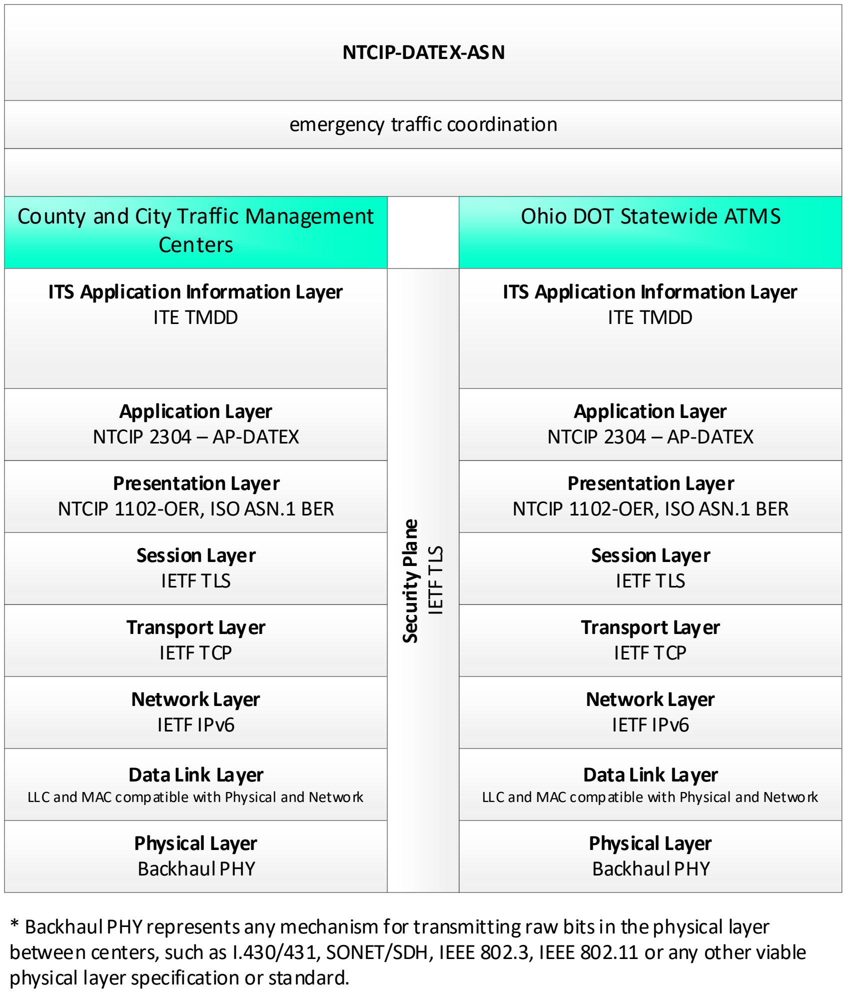
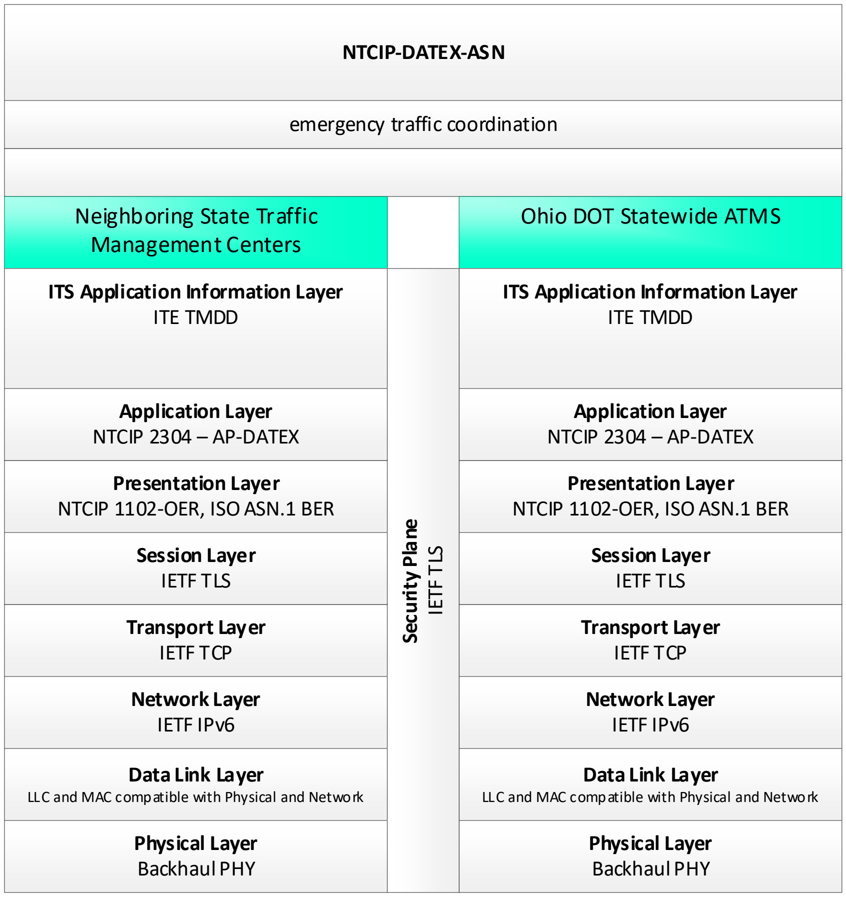
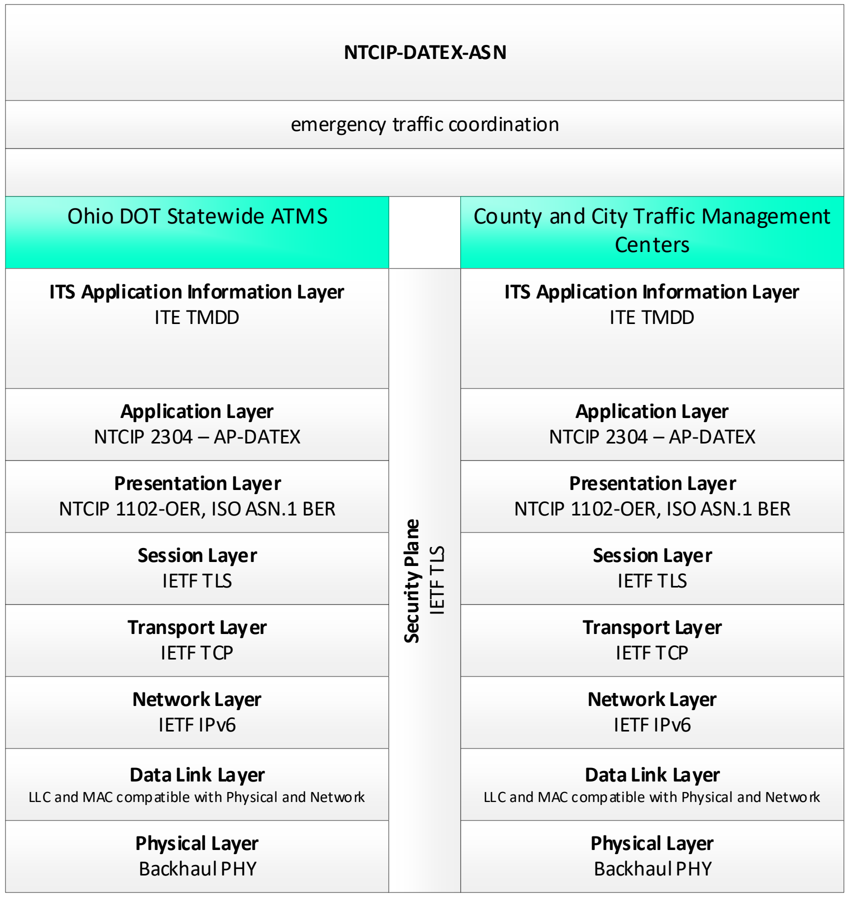


Figure 133 F: emergency traffic coordination / S: County and City Traffic Management Centers -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



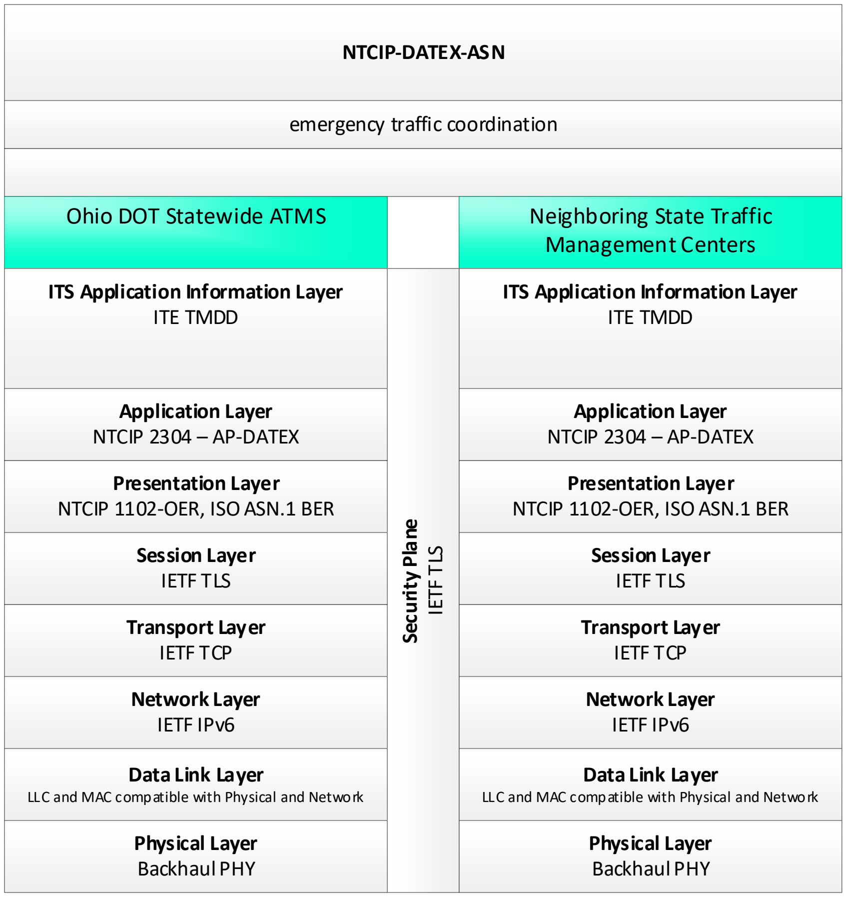
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 134 F: emergency traffic coordination / S: Neighboring State Traffic Management Centers -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



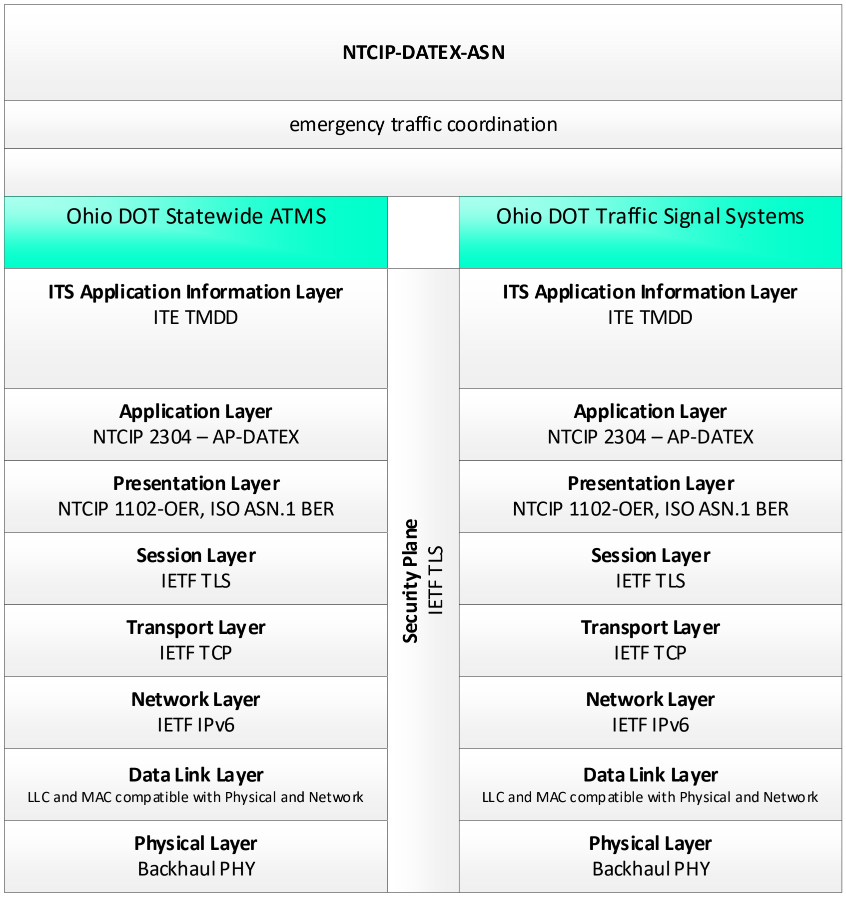
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 135 F: emergency traffic coordination / S: Ohio DOT Statewide ATMS -> D: County and City Traffic Management Centers / P: NTCIP-DATEX



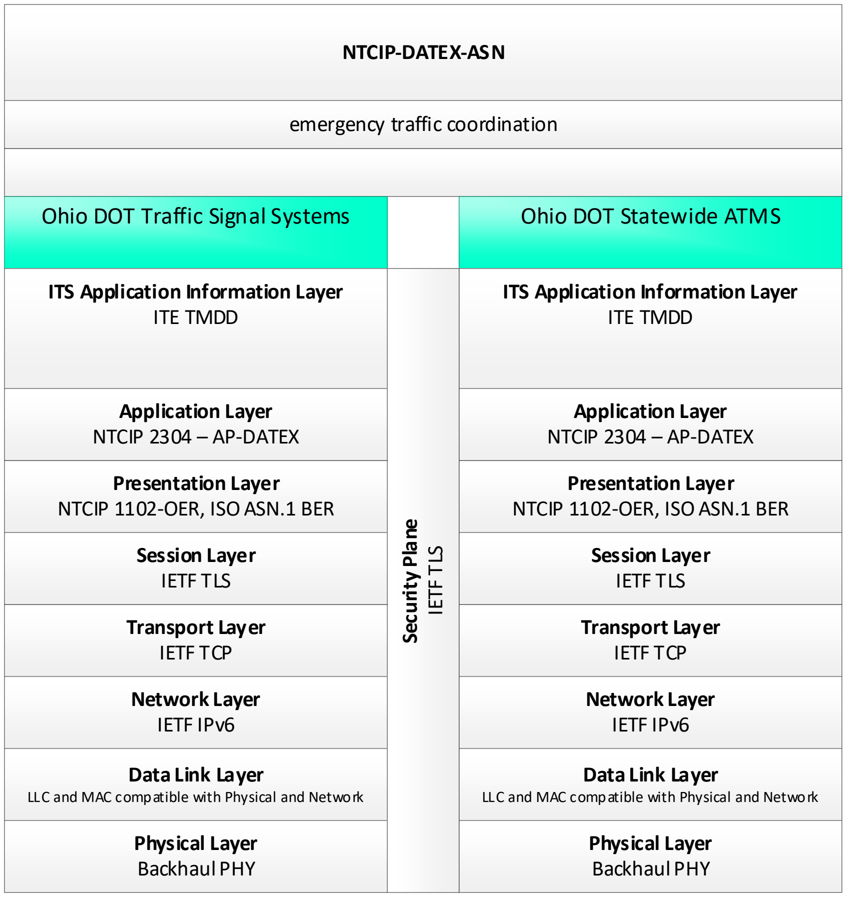
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 136 F: emergency traffic coordination / S: Ohio DOT Statewide ATMS -> D: Neighboring State Traffic Management Centers / P: NTCIP-DATEX



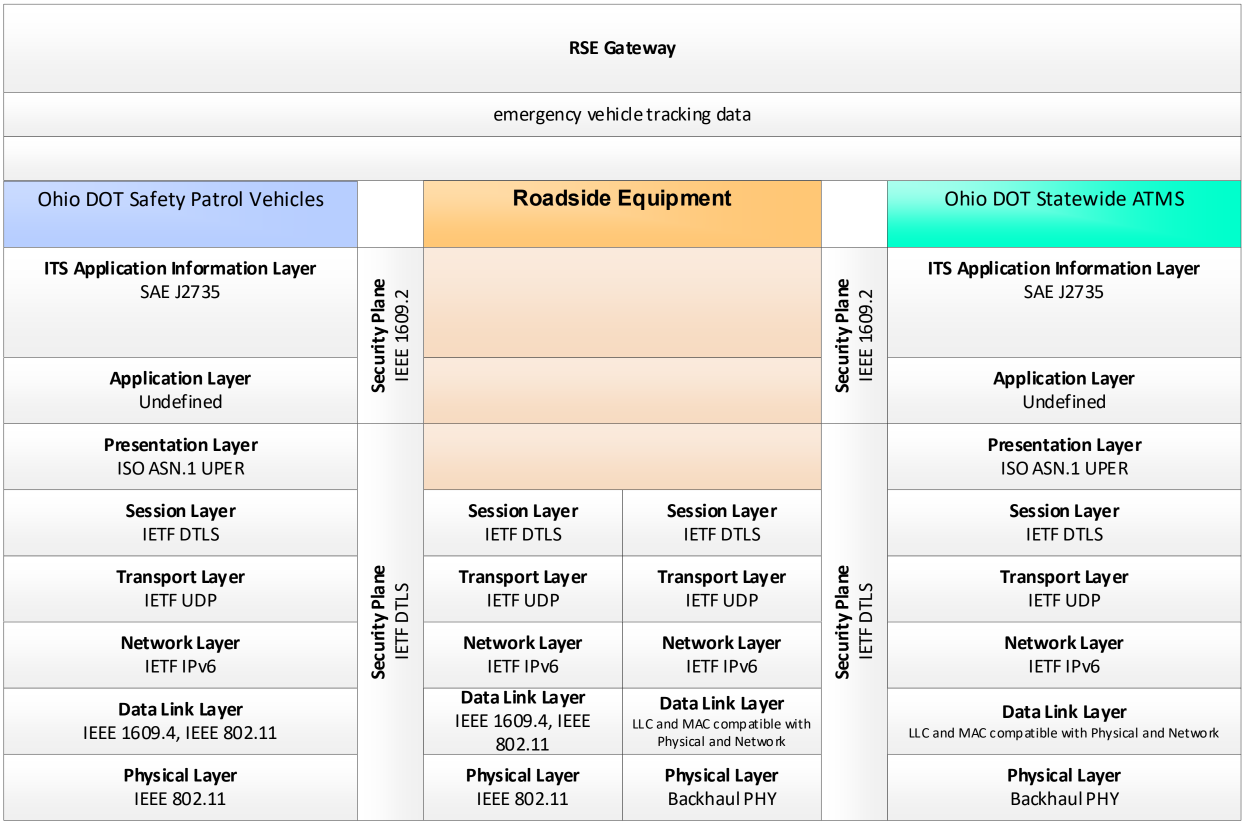
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 137 F: emergency traffic coordination / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Traffic Signal Systems / P: NTCIP-DATEX



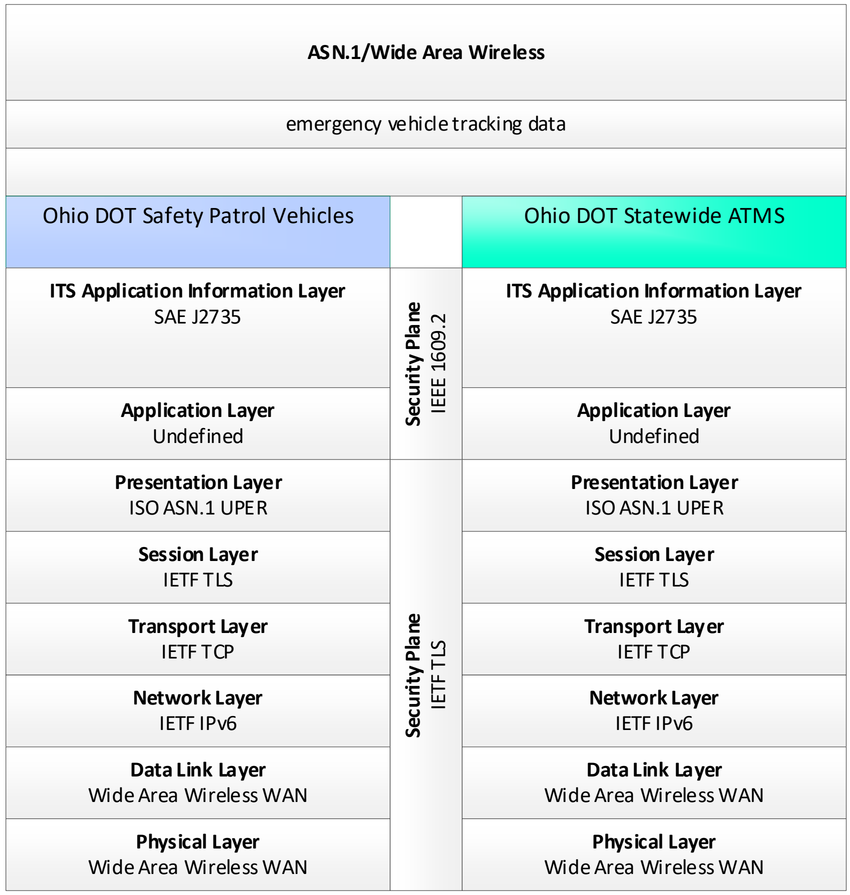
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 138 F: emergency traffic coordination / S: Ohio DOT Traffic Signal Systems -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 139 F: emergency vehicle tracking data / S: Ohio DOT Safety Patrol Vehicles -> D: Ohio DOT Statewide ATMS / P: RSEGateway-VehicleSource



* IEEE 1609.2 is an available standard to consider depending on physical device in the vehicle.

Figure 140 F: emergency vehicle tracking data / S: Ohio DOT Safety Patrol Vehicles -> D: Ohio DOT Statewide ATMS / P: WAW-ASN1

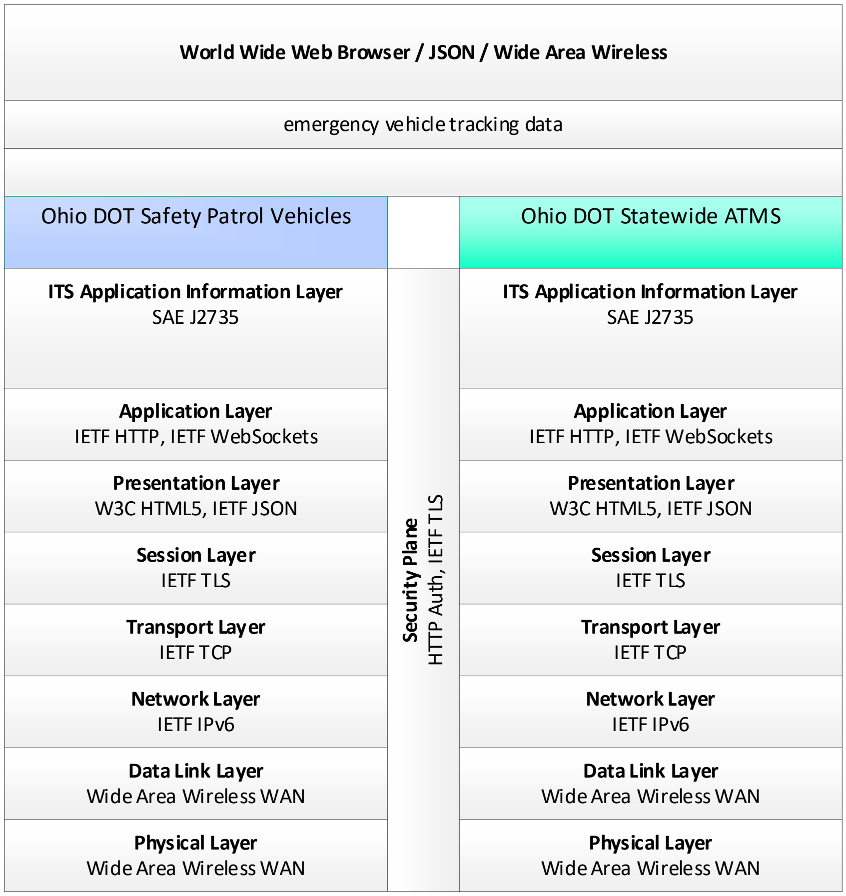


Figure 141 F: emergency vehicle tracking data / S: Ohio DOT Safety Patrol Vehicles -> D: Ohio DOT Statewide ATMS / P: WAW-WWWBrowser-JSON

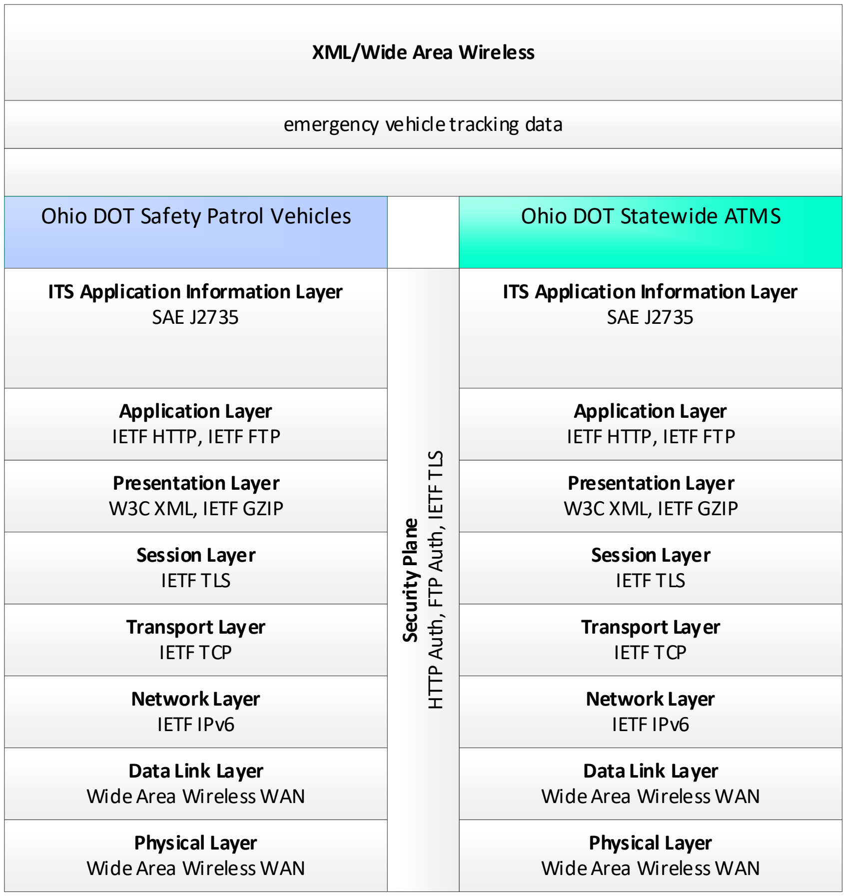
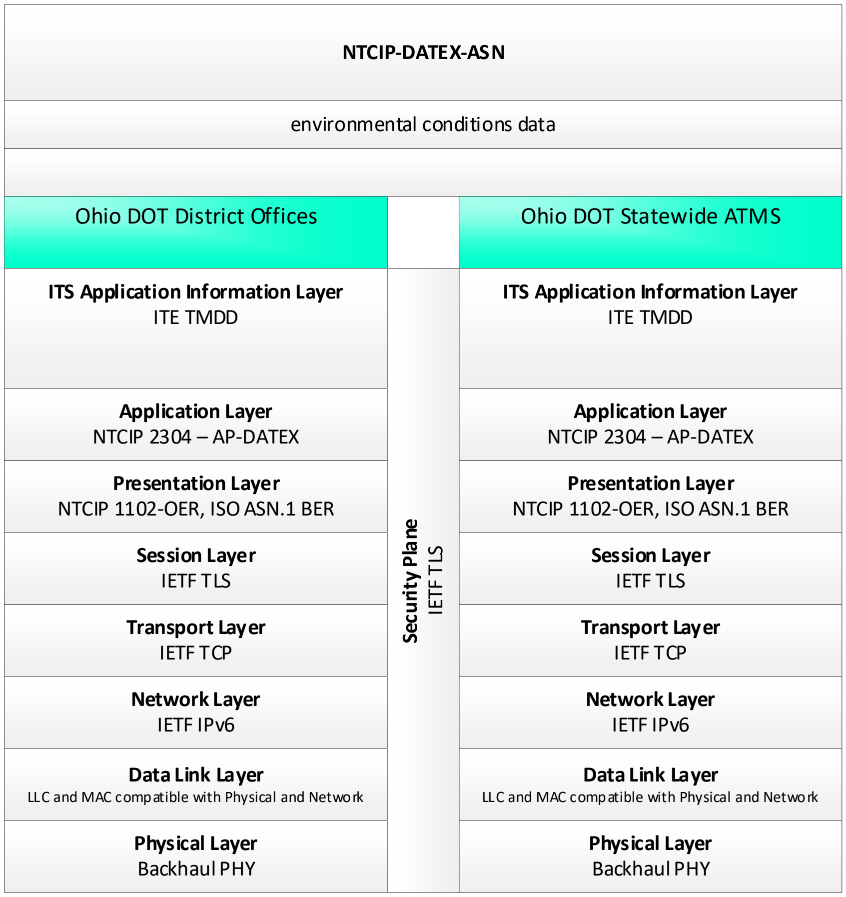
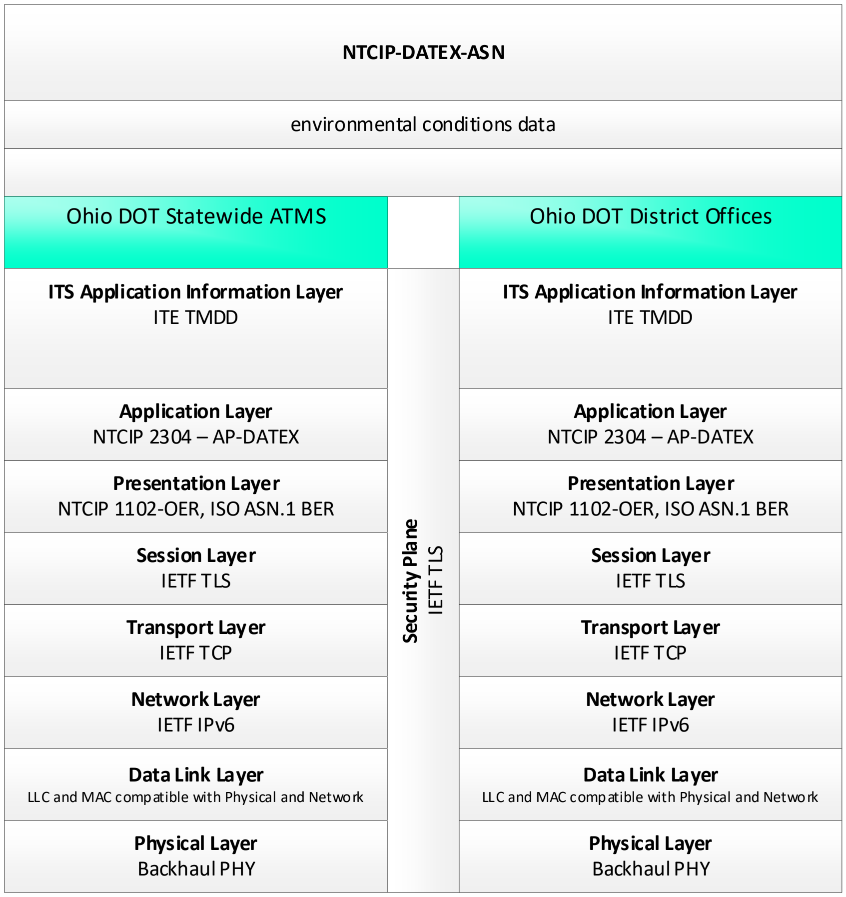


Figure 142 F: emergency vehicle tracking data / S: Ohio DOT Safety Patrol Vehicles -> D: Ohio DOT Statewide ATMS / P: WAW-XML



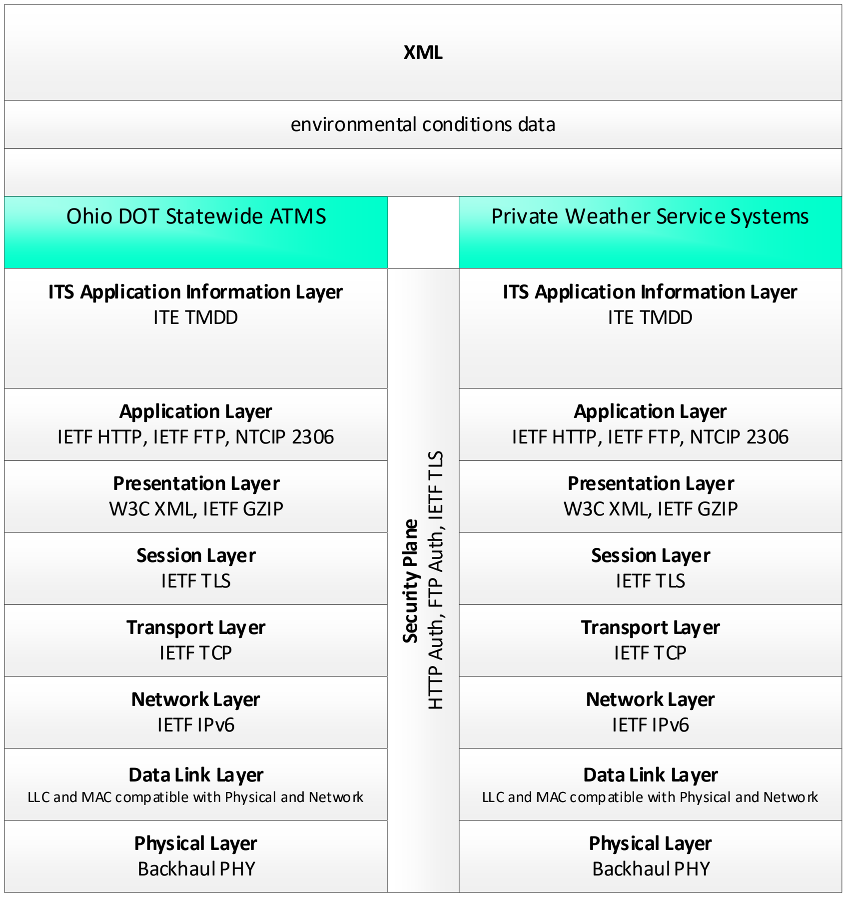
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 143 F: environmental conditions data / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



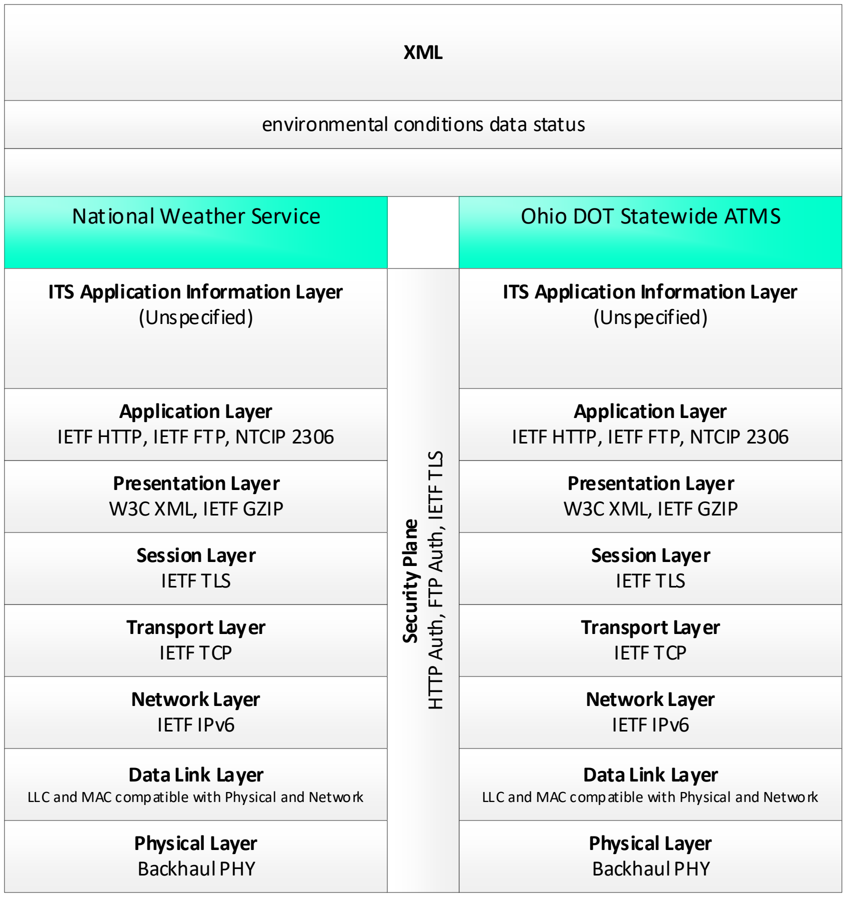
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 144 F: environmental conditions data / S: Ohio DOT Statewide ATMS -> D: Ohio DOT District Offices / P: NTCIP-DATEX



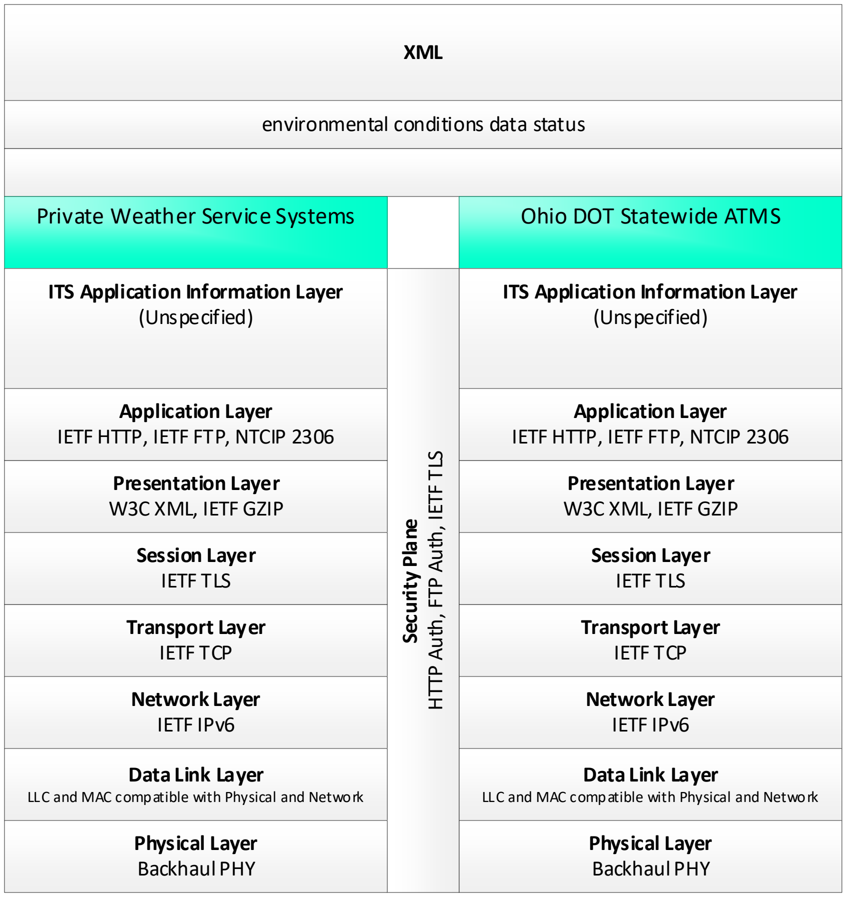
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 145 F: environmental conditions data / S: Ohio DOT Statewide ATMS -> D: Private Weather Service Systems / P: XML



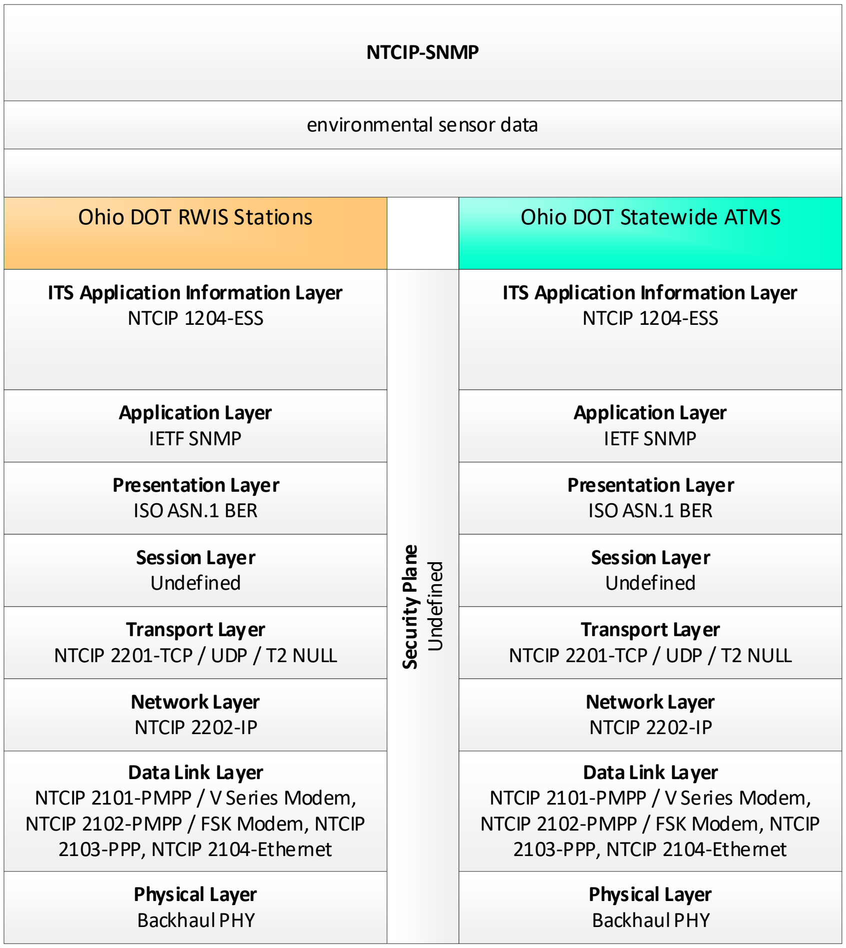
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 146 F: environmental conditions data status / S: National Weather Service -> D: Ohio DOT Statewide ATMS / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 147 F: environmental conditions data status / S: Private Weather Service Systems -> D: Ohio DOT Statewide ATMS / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 148 F: environmental sensor data / S: Ohio DOT RWIS Stations -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP

NTCIP-SNMP		
environmental sensor data		
Ohio DOT Speed Monitoring Roadside Equipment		Ohio DOT Statewide ATMS
ITS Application Information Layer NTCIP 1204-ESS	**Security Plane** Undefined	**ITS Application Information Layer** NTCIP 1204-ESS
Application Layer IETF SNMP		**Application Layer** IETF SNMP
Presentation Layer ISO ASN.1 BER		**Presentation Layer** ISO ASN.1 BER
Session Layer Undefined		**Session Layer** Undefined
Transport Layer NTCIP 2201-TCP / UDP / T2 NULL		**Transport Layer** NTCIP 2201-TCP / UDP / T2 NULL
Network Layer NTCIP 2202-IP		**Network Layer** NTCIP 2202-IP
Data Link Layer NTCIP 2101-PMPP / V Series Modem, NTCIP 2102-PMPP / FSK Modem, NTCIP 2103-PPP, NTCIP 2104-Ethernet		**Data Link Layer** NTCIP 2101-PMPP / V Series Modem, NTCIP 2102-PMPP / FSK Modem, NTCIP 2103-PPP, NTCIP 2104-Ethernet
Physical Layer Backhaul PHY		**Physical Layer** Backhaul PHY

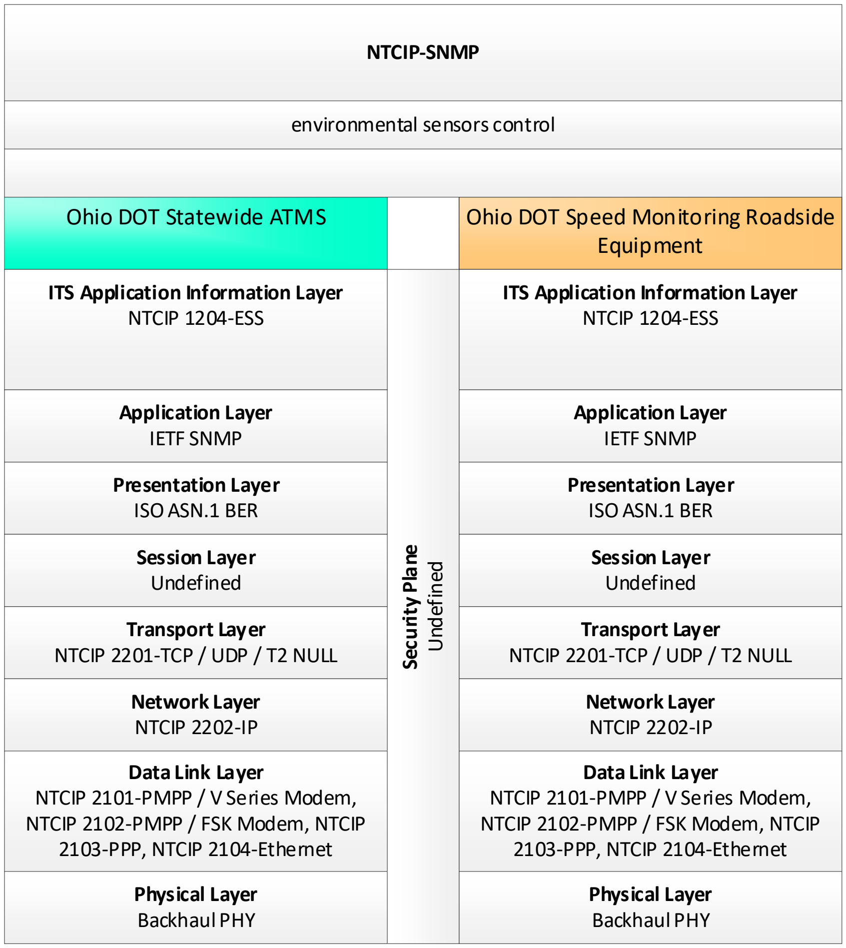
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 149 F: environmental sensor data / S: Ohio DOT Speed Monitoring Roadside Equipment -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP

NTCIP-SNMP		
environmental sensors control		
Ohio DOT Statewide ATMS		Ohio DOT RWIS Stations
ITS Application Information Layer NTCIP 1204-ESS	**Security Plane** Undefined	**ITS Application Information Layer** NTCIP 1204-ESS
Application Layer IETF SNMP		**Application Layer** IETF SNMP
Presentation Layer ISO ASN.1 BER		**Presentation Layer** ISO ASN.1 BER
Session Layer Undefined		**Session Layer** Undefined
Transport Layer NTCIP 2201-TCP / UDP / T2 NULL		**Transport Layer** NTCIP 2201-TCP / UDP / T2 NULL
Network Layer NTCIP 2202-IP		**Network Layer** NTCIP 2202-IP
Data Link Layer NTCIP 2101-PMPP / V Series Modem, NTCIP 2102-PMPP / FSK Modem, NTCIP 2103-PPP, NTCIP 2104-Ethernet		**Data Link Layer** NTCIP 2101-PMPP / V Series Modem, NTCIP 2102-PMPP / FSK Modem, NTCIP 2103-PPP, NTCIP 2104-Ethernet
Physical Layer Backhaul PHY		**Physical Layer** Backhaul PHY

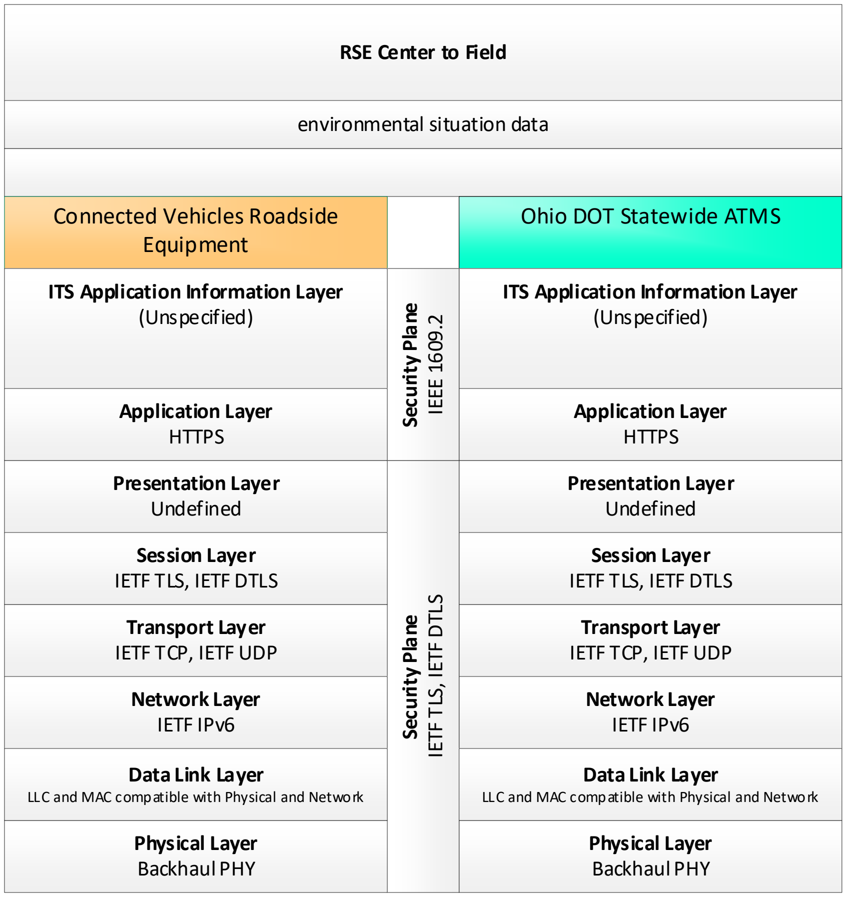
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 150 F: environmental sensors control / S: Ohio DOT Statewide ATMS -> D: Ohio DOT RWIS Stations / P: NTCIP-SNMP



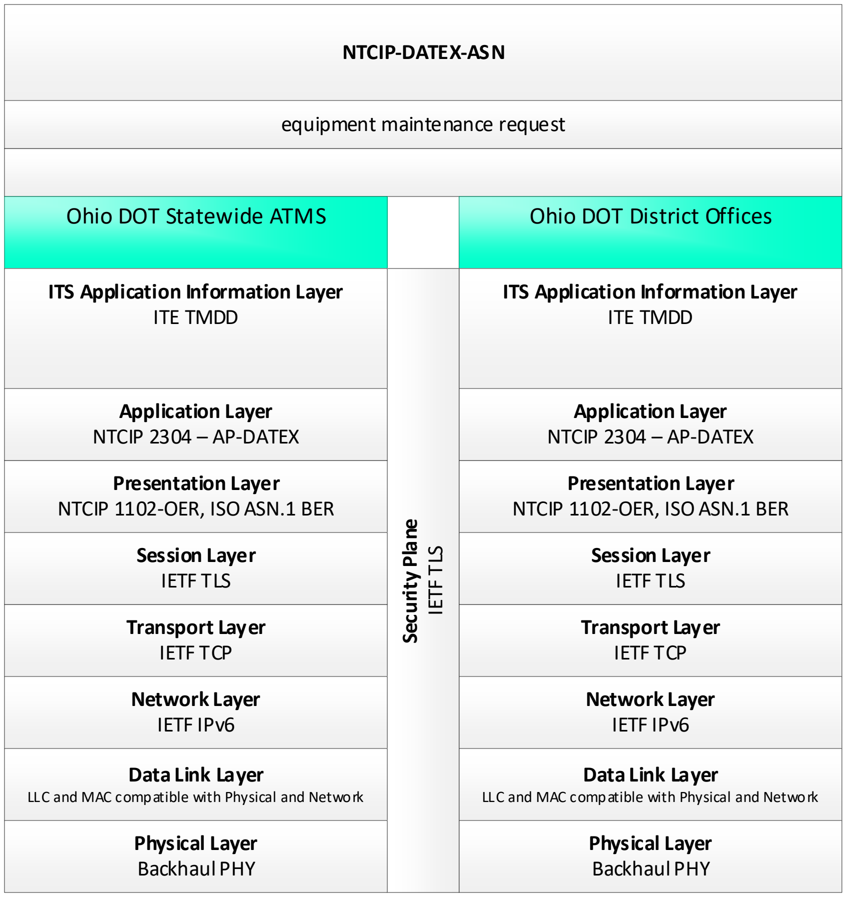
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 151 F: environmental sensors control / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Speed Monitoring Roadside Equipment / P: NTCIP-SNMP



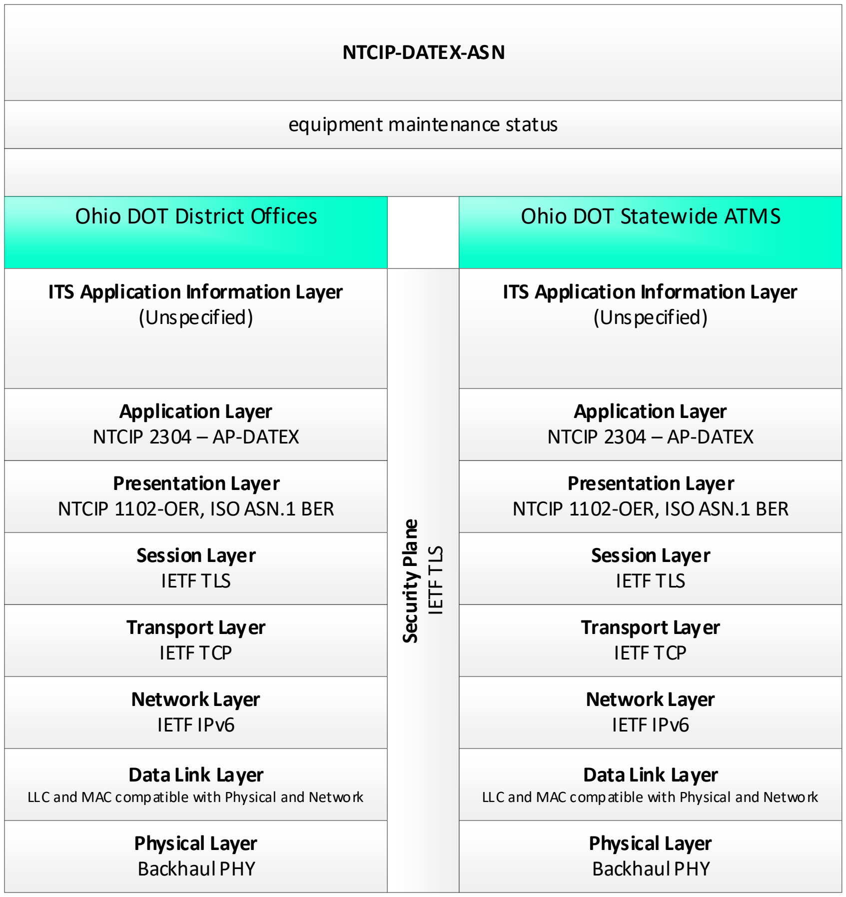
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 152 F: environmental situation data / S: Connected Vehicles Roadside Equipment -> D: Ohio DOT Statewide ATMS / P: RSE-C2F-SNMP



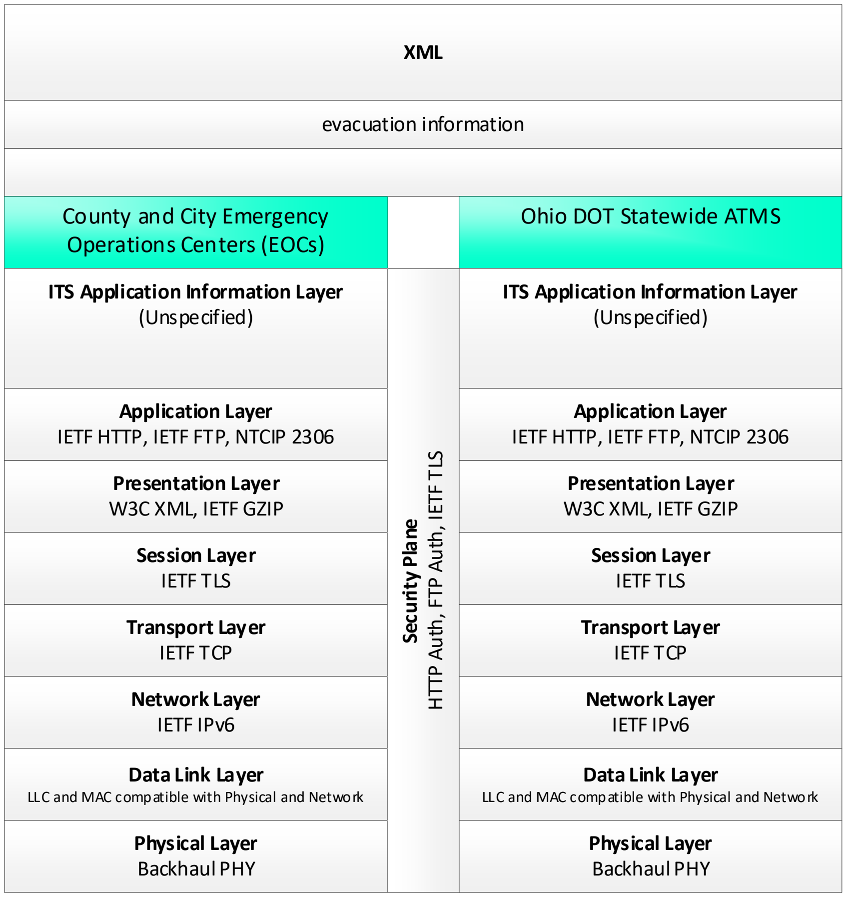
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 153 F: equipment maintenance request / S: Ohio DOT Statewide ATMS -> D: Ohio DOT District Offices / P: NTCIP-DATEX



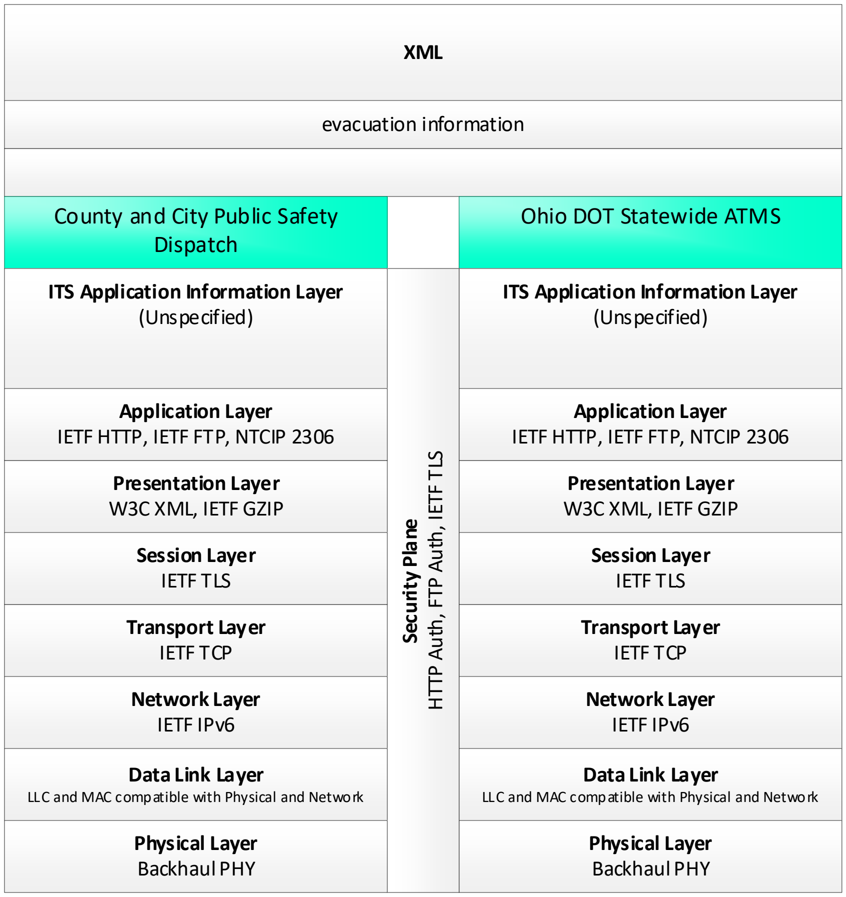
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 154 F: equipment maintenance status / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



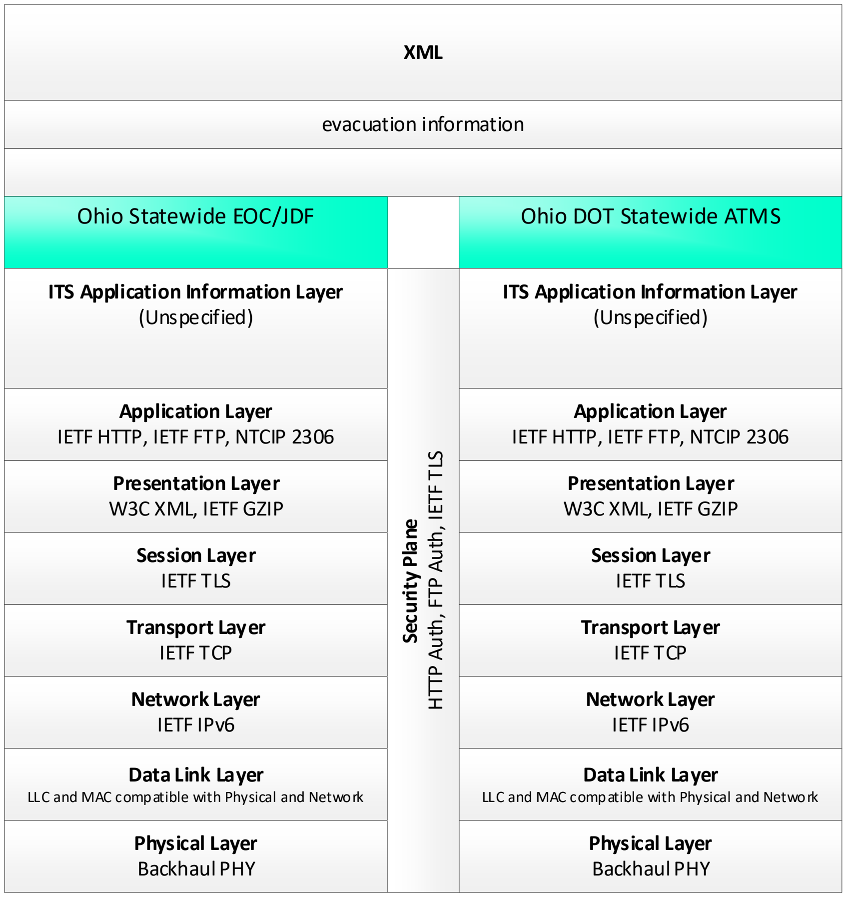
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 155 F: evacuation information / S: County and City Emergency Operations Centers (EOCs) -> D: Ohio DOT Statewide ATMS / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 156 F: evacuation information / S: County and City Public Safety Dispatch -> D: Ohio DOT Statewide ATMS / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 157 F: evacuation information / S: Ohio Statewide EOC/JDF -> D: Ohio DOT Statewide ATMS / P: XML

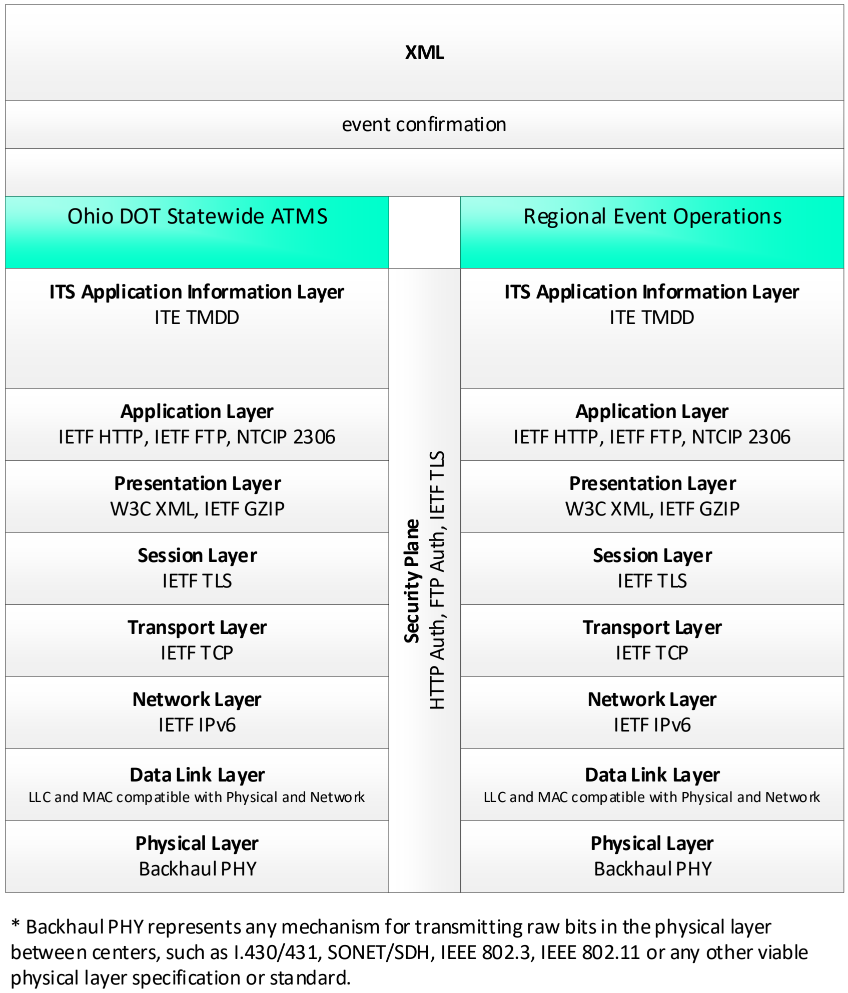
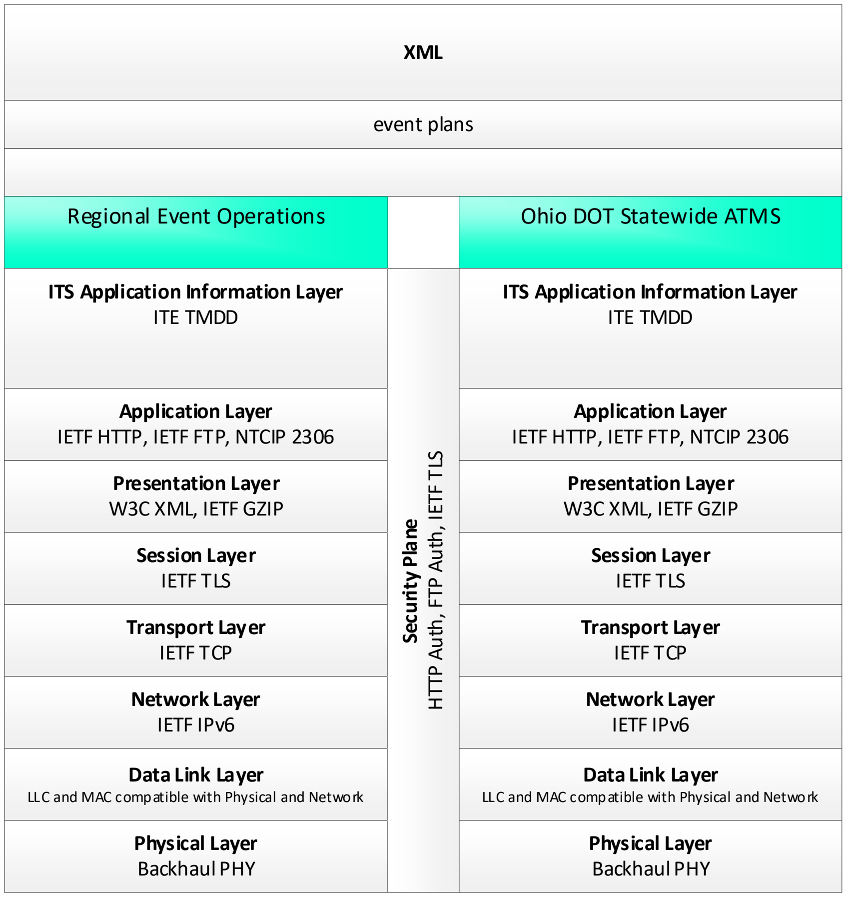
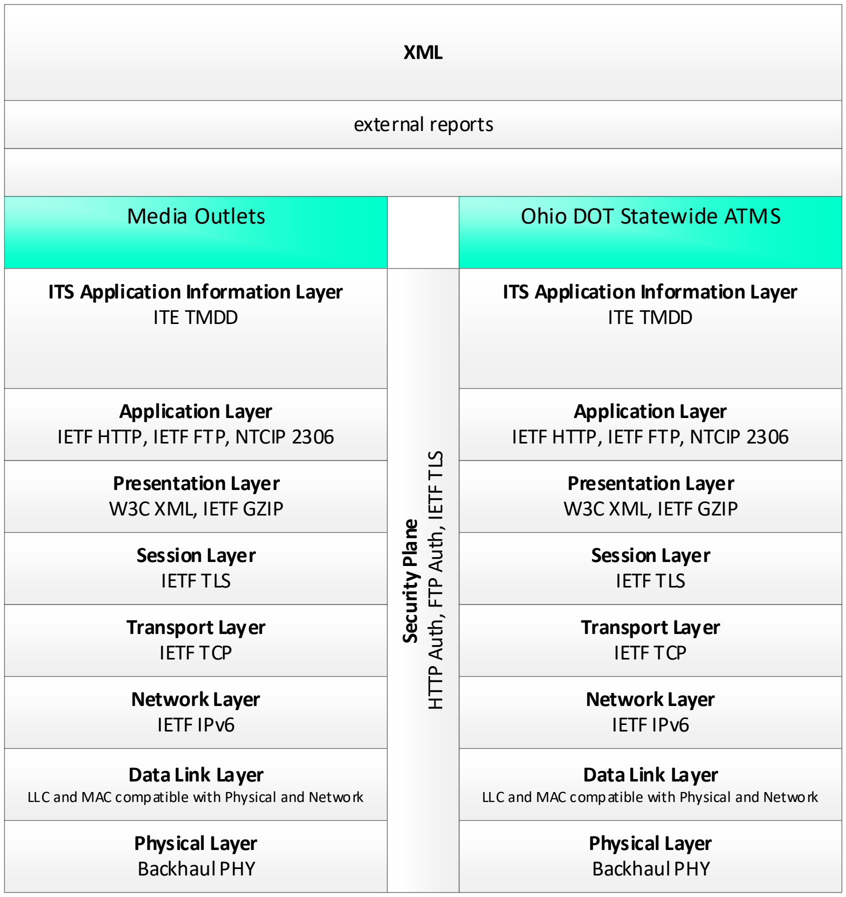


Figure 158 F: event confirmation / S: Ohio DOT Statewide ATMS -> D: Regional Event Operations / P: XML



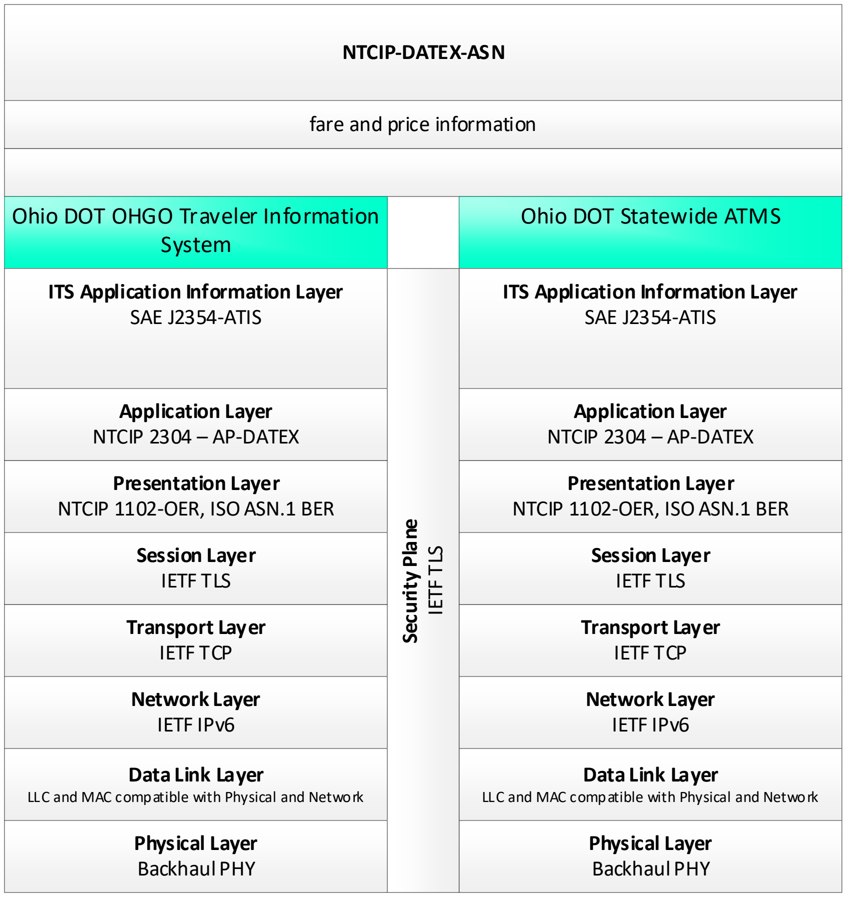
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 159 F: event plans / S: Regional Event Operations -> D: Ohio DOT Statewide ATMS / P: XML



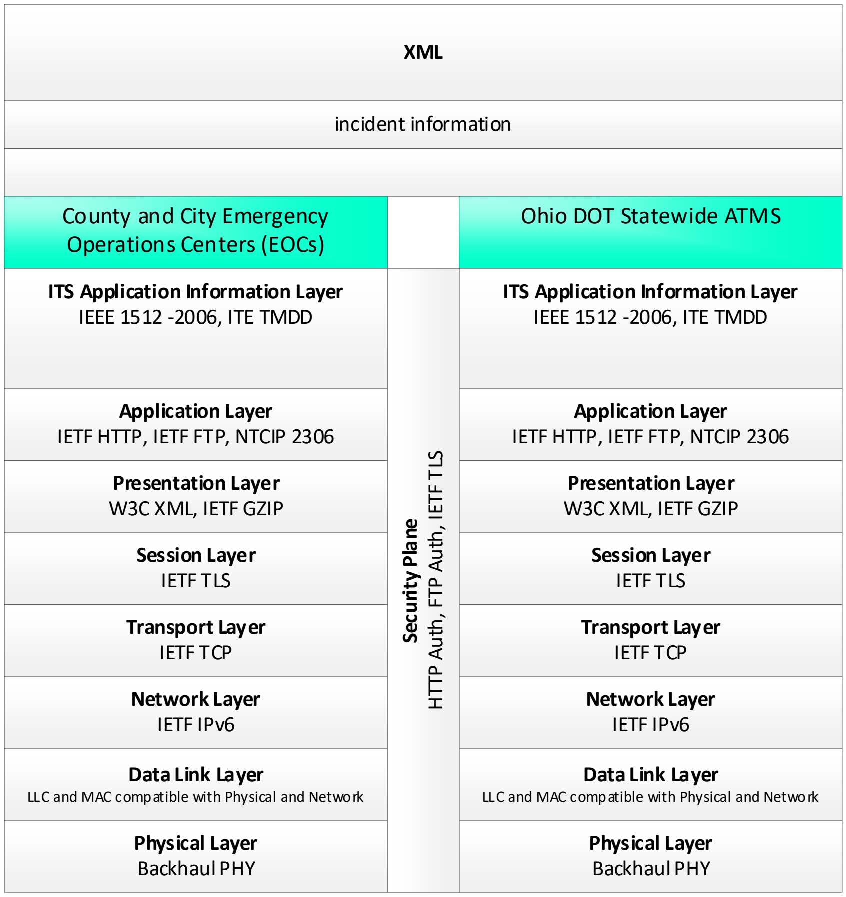
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 160 F: external reports / S: Media Outlets -> D: Ohio DOT Statewide ATMS / P: XML



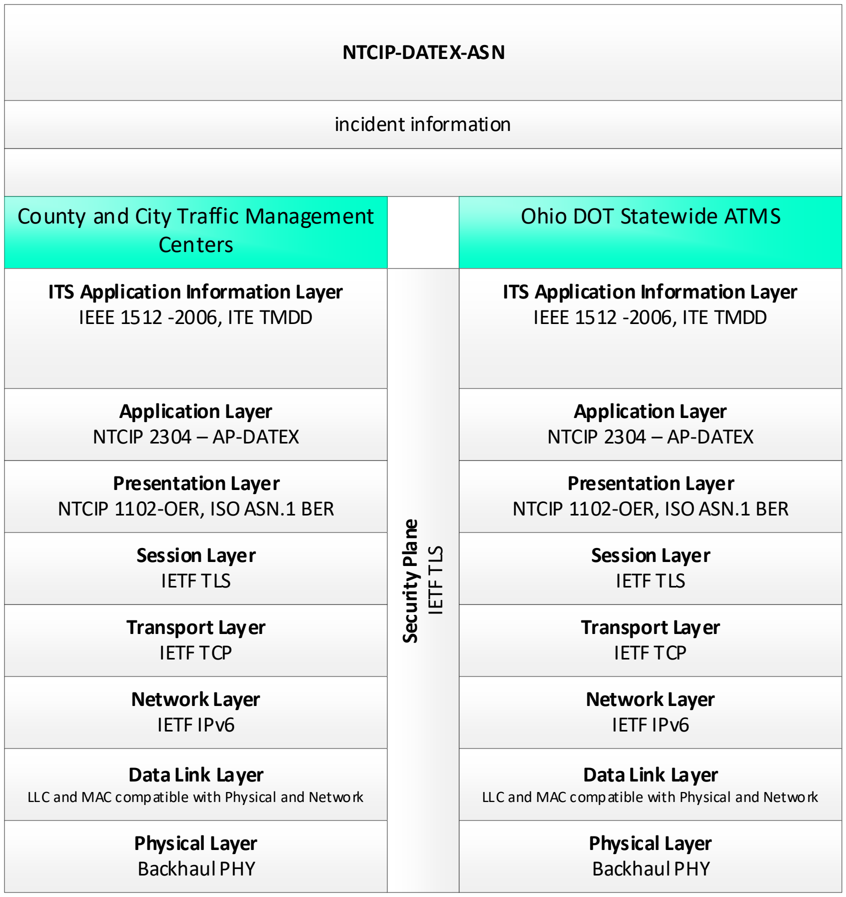
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 161 F: fare and price information / S: Ohio DOT OHGO Traveler Information System -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



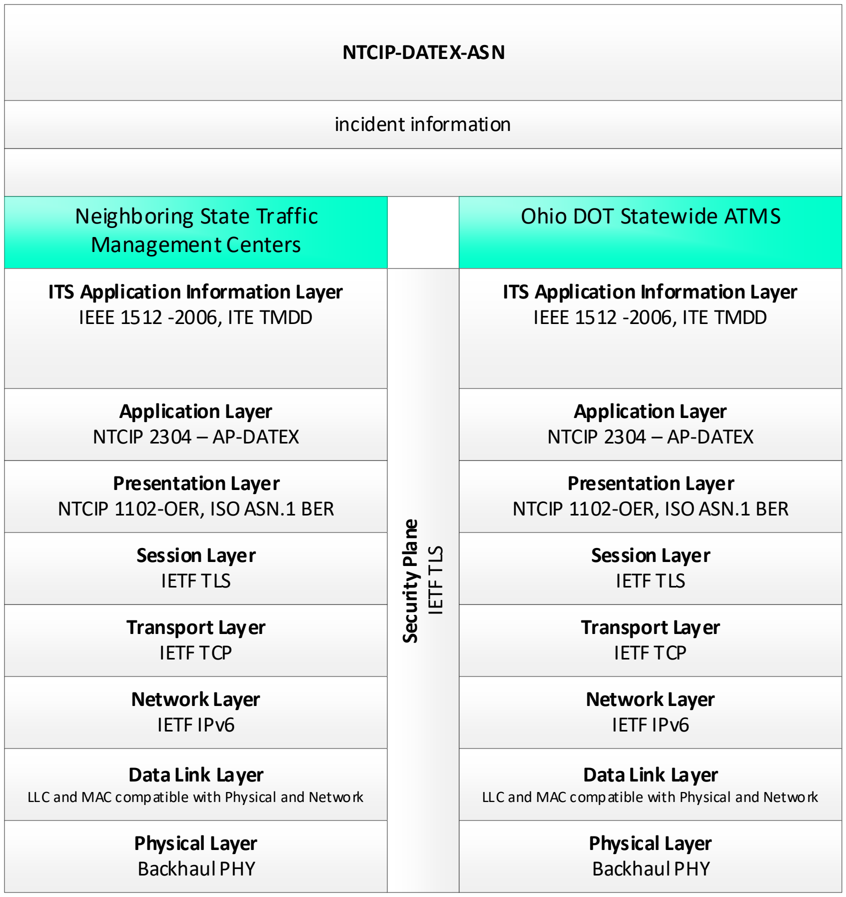
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 162 F: incident information / S: County and City Emergency Operations Centers (EOCs) -> D: Ohio DOT Statewide ATMS / P: XML



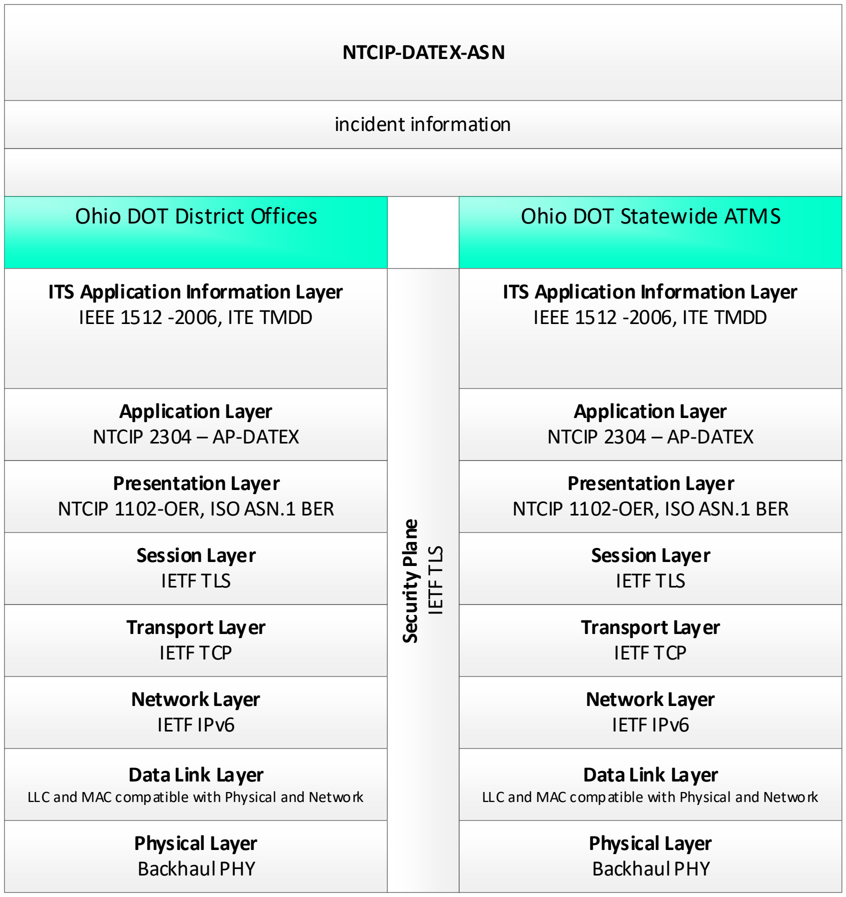
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 163 F: incident information / S: County and City Traffic Management Centers -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



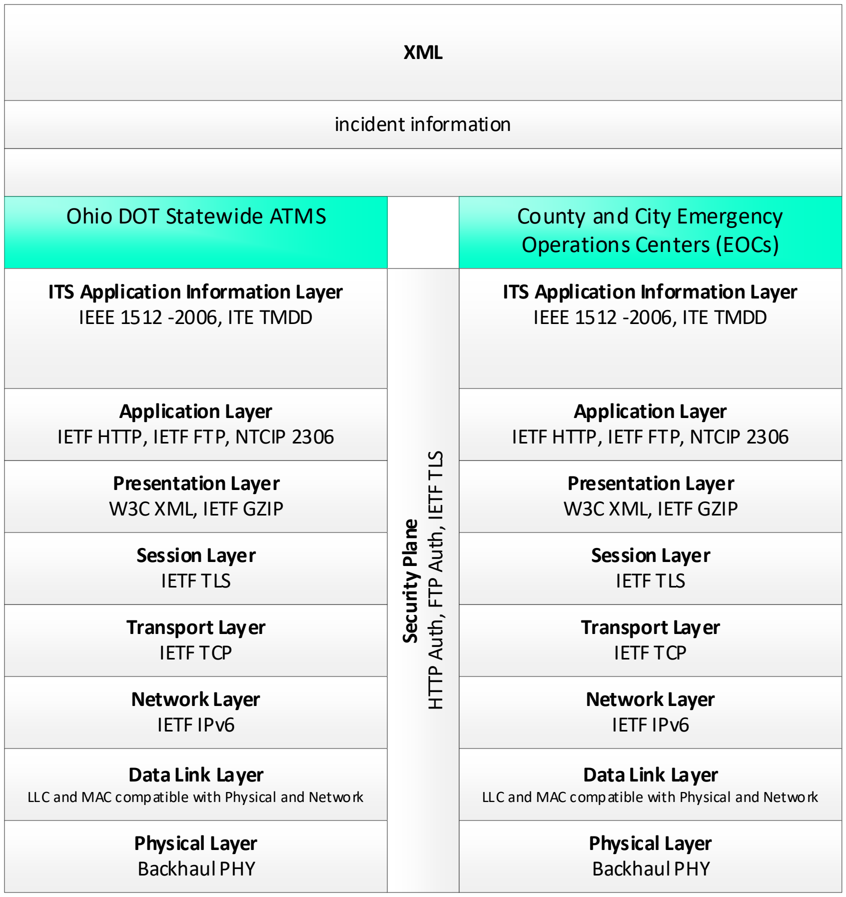
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 164 F: incident information / S: Neighboring State Traffic Management Centers -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



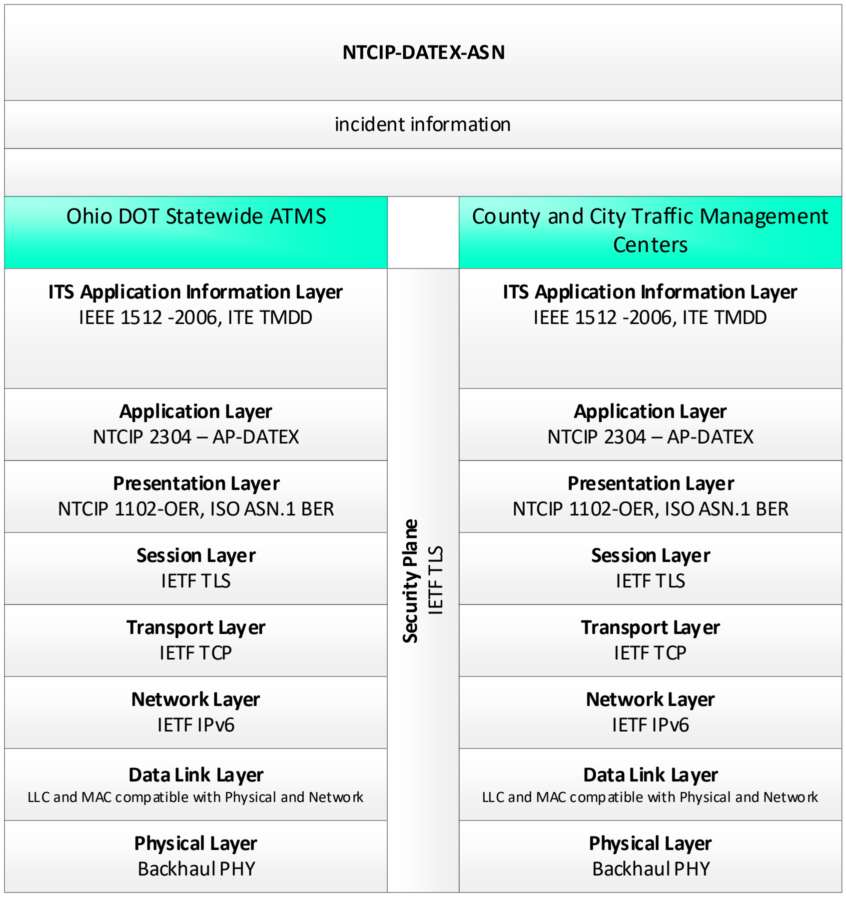
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 165 F: incident information / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



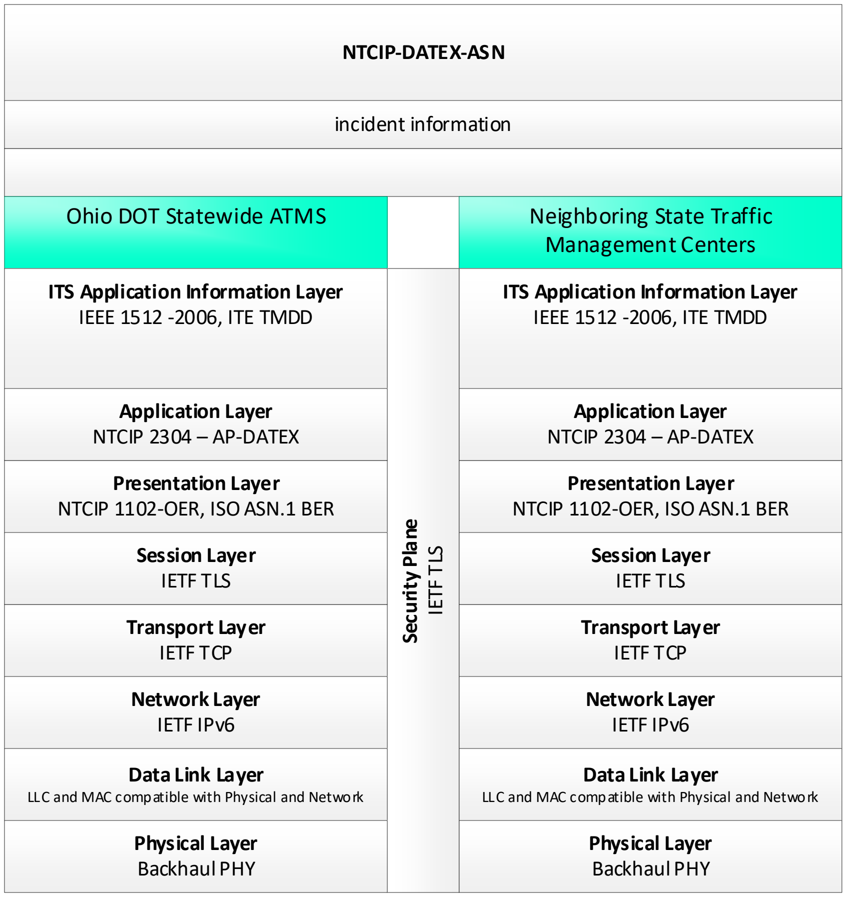
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 166 F: incident information / S: Ohio DOT Statewide ATMS -> D: County and City Emergency Operations Centers (EOCs) / P: XML



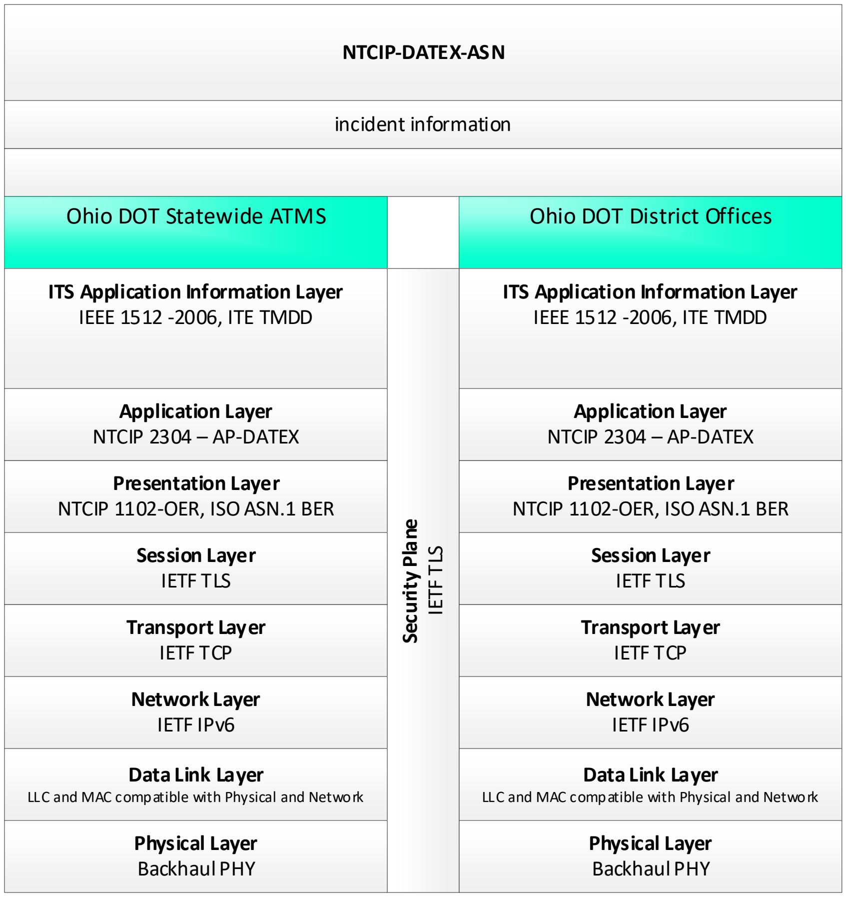
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 167 F: incident information / S: Ohio DOT Statewide ATMS -> D: County and City Traffic Management Centers / P: NTCIP-DATEX



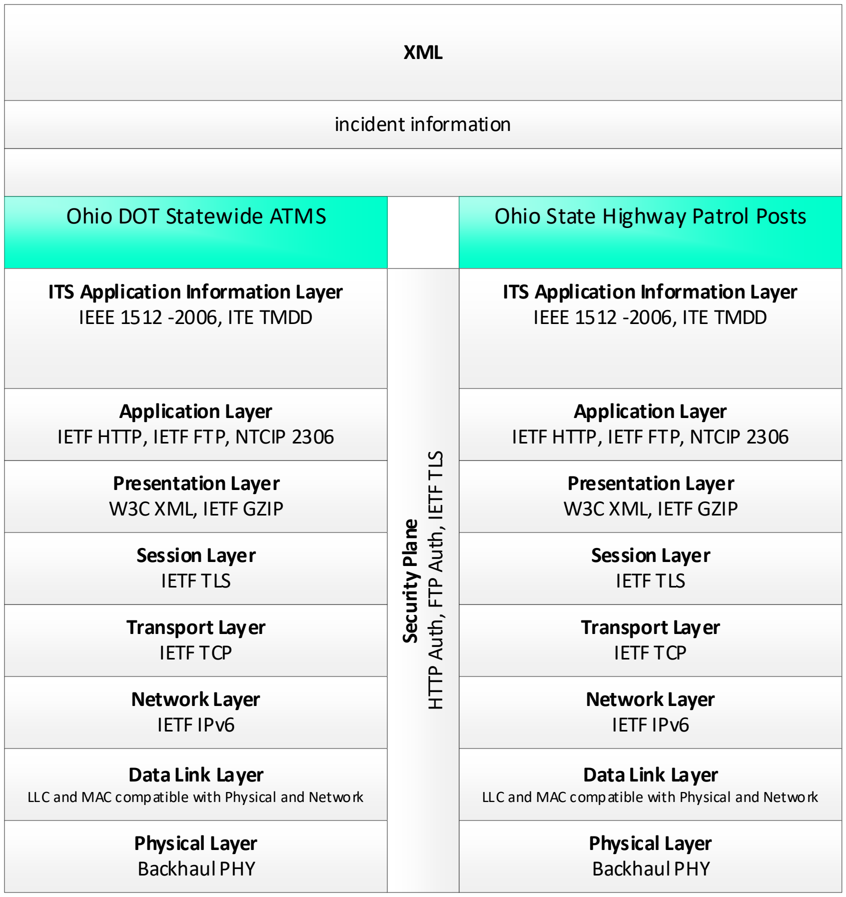
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 168 F: incident information / S: Ohio DOT Statewide ATMS -> D: Neighboring State Traffic Management Centers / P: NTCIP-DATEX



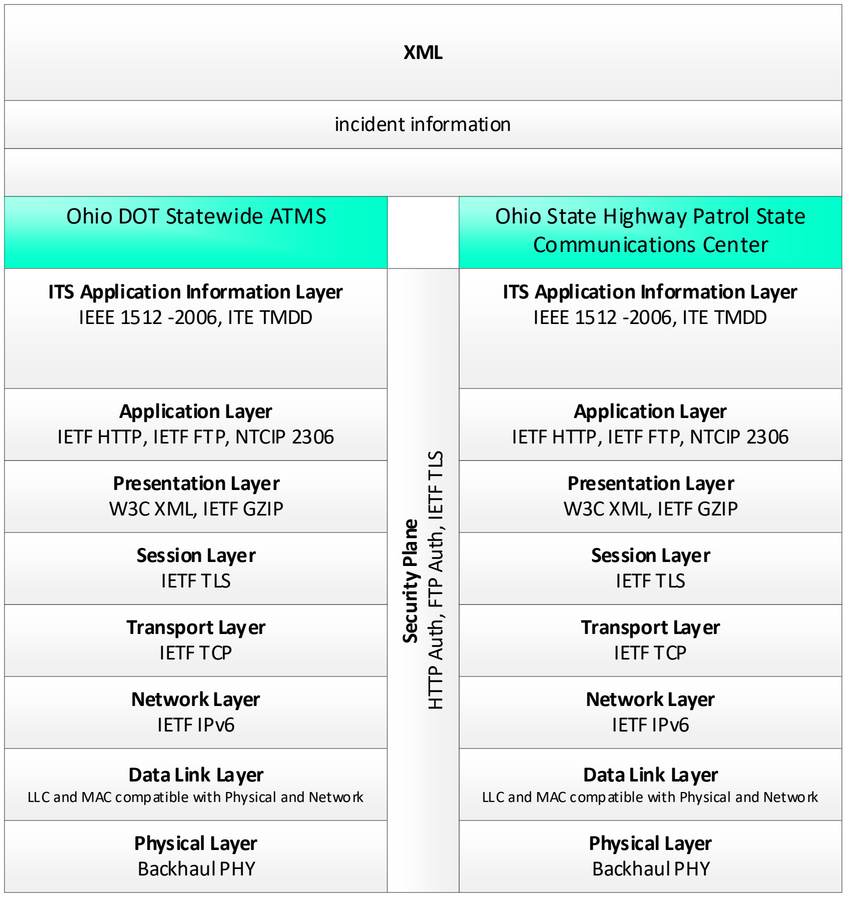
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 169 F: incident information / S: Ohio DOT Statewide ATMS -> D: Ohio DOT District Offices / P: NTCIP-DATEX



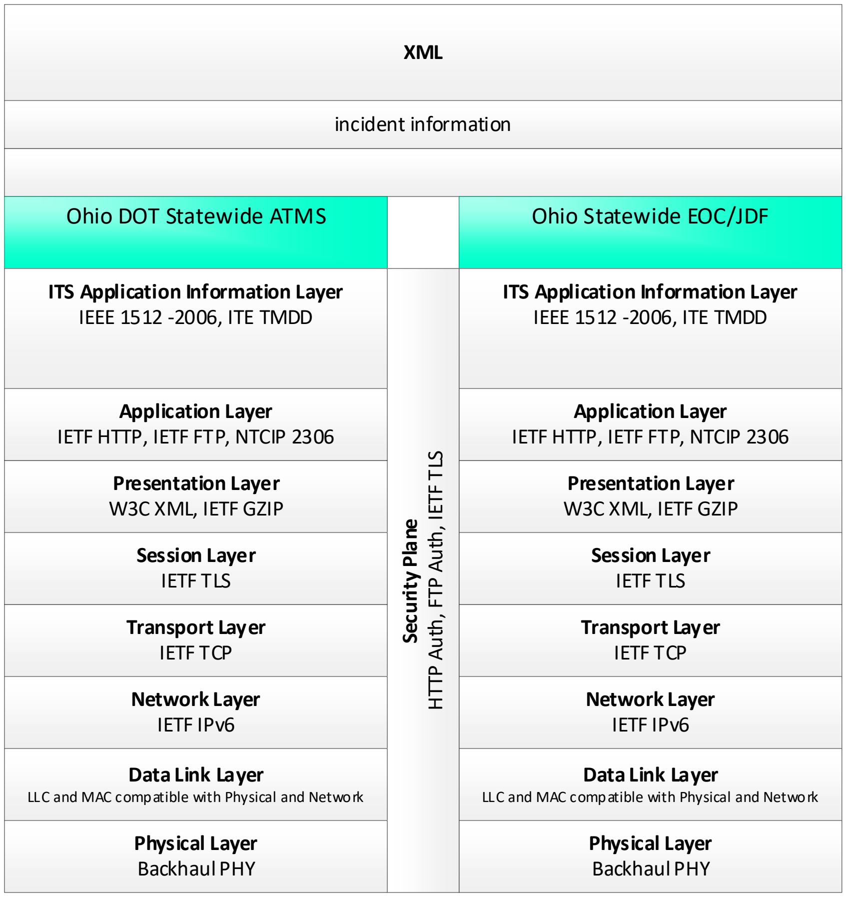
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 170 F: incident information / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol Posts / P: XML



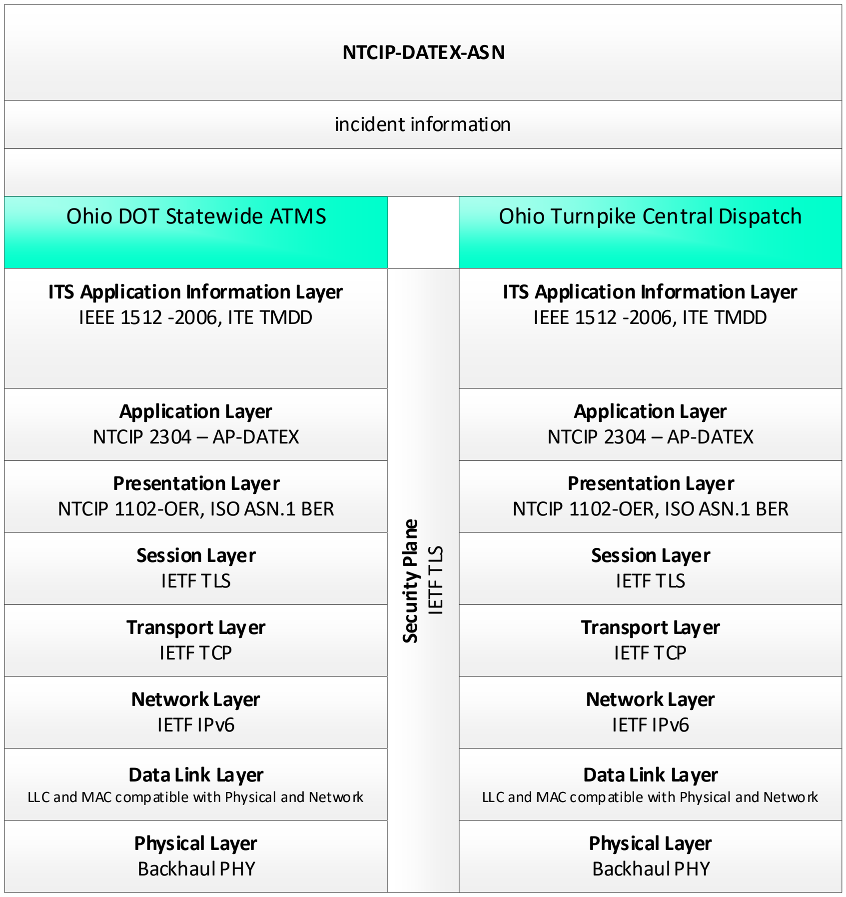
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 171 F: incident information / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol State Communications Center / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 172 F: incident information / S: Ohio DOT Statewide ATMS -> D: Ohio Statewide EOC/JDF / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 173 F: incident information / S: Ohio DOT Statewide ATMS -> D: Ohio Turnpike Central Dispatch / P: NTCIP-DATEX

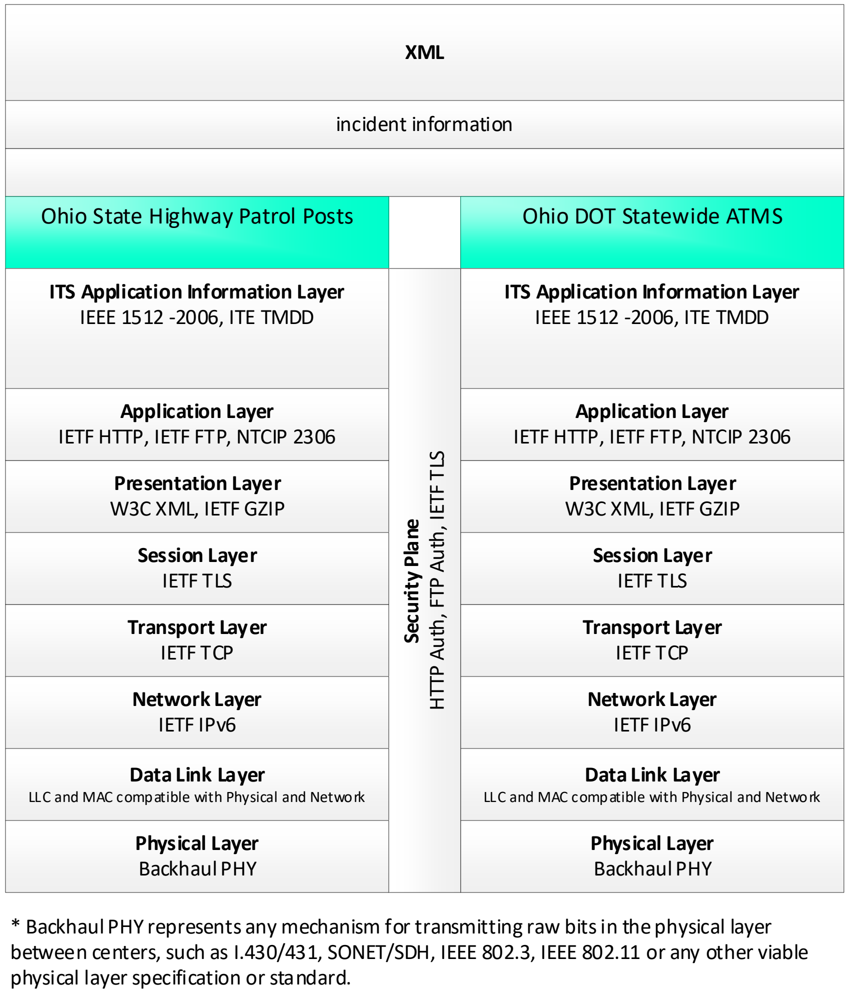
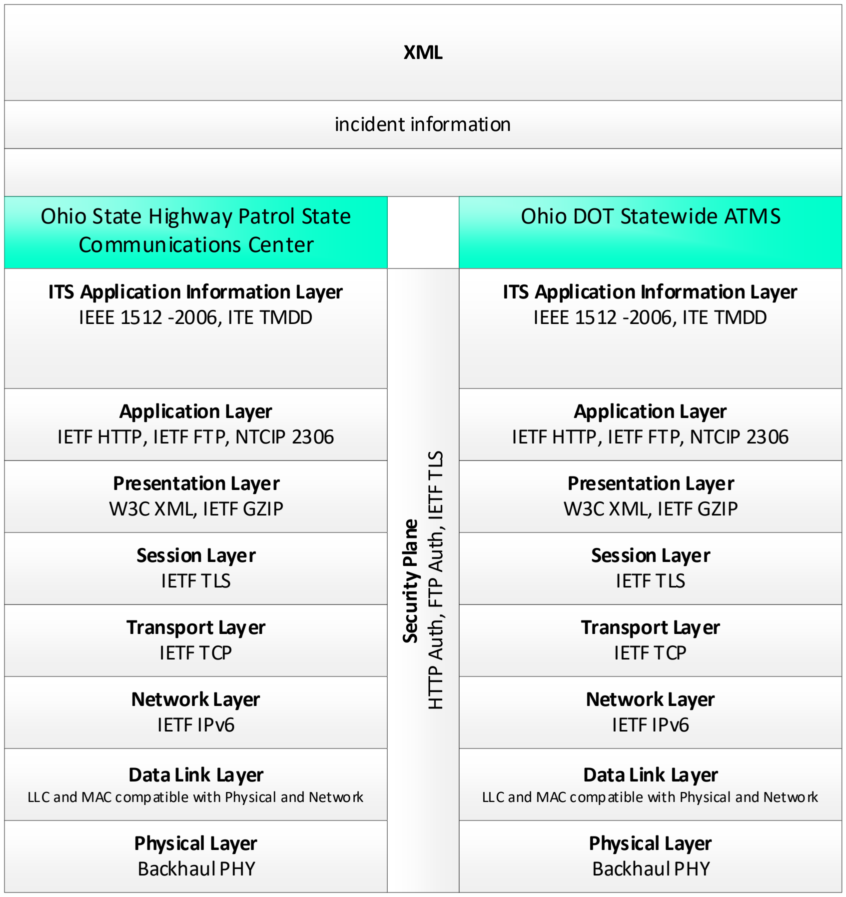
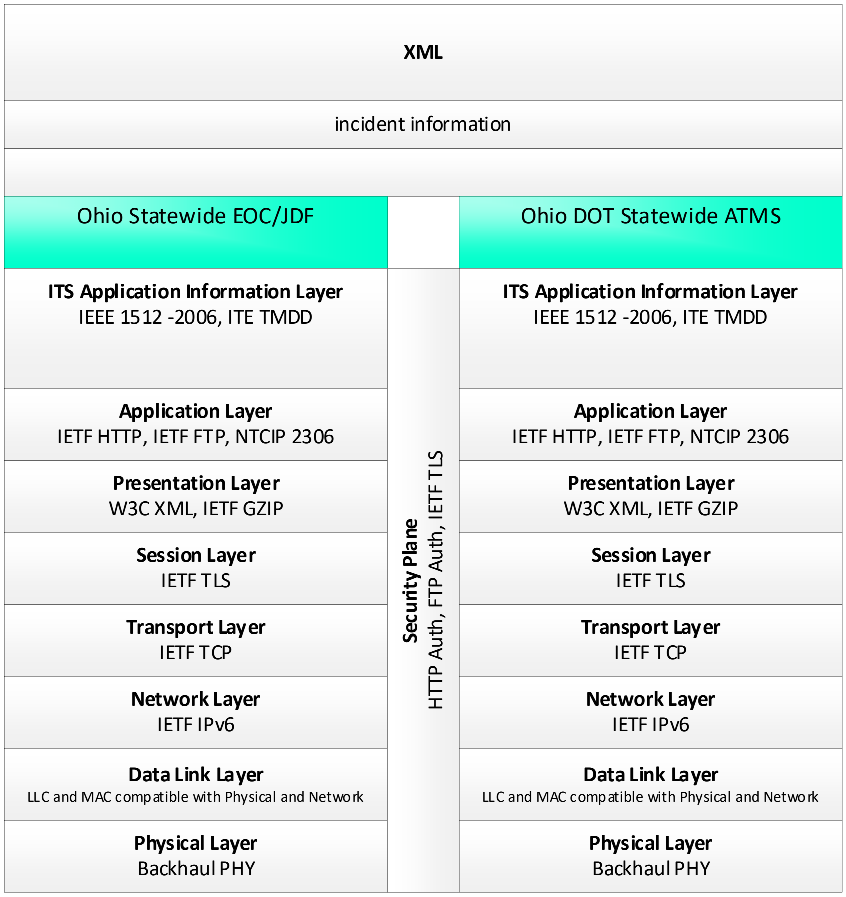


Figure 174 F: incident information / S: Ohio State Highway Patrol Posts -> D: Ohio DOT Statewide ATMS / P: XML



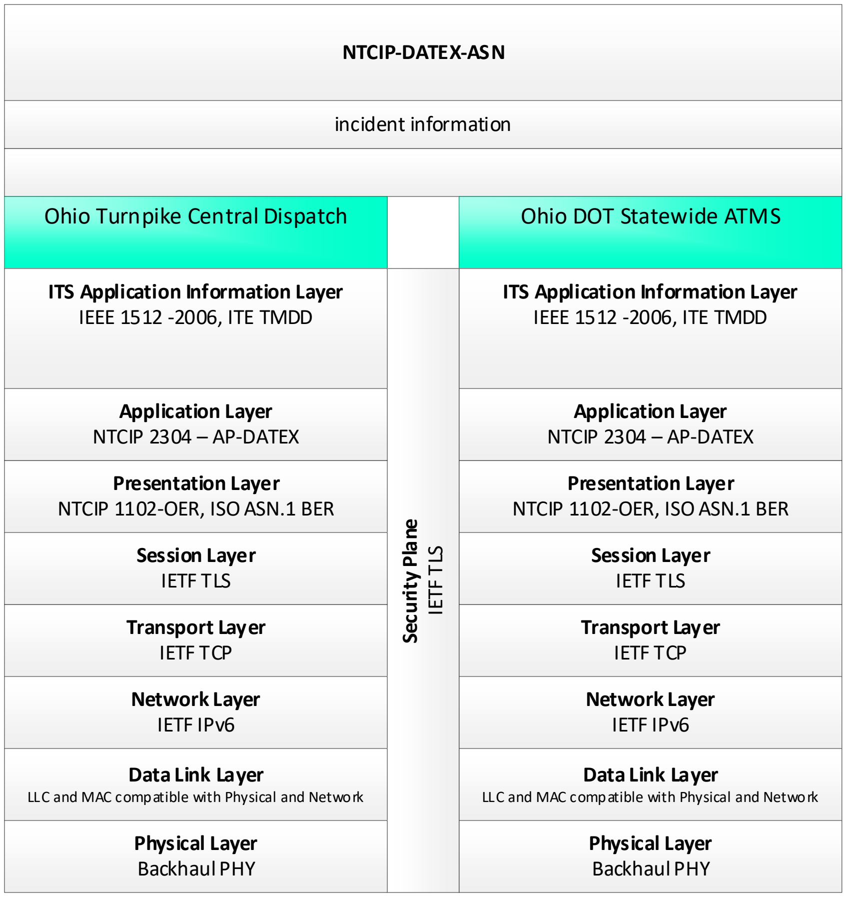
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 175 F: incident information / S: Ohio State Highway Patrol State Communications Center -> D: Ohio DOT Statewide ATMS / P: XML



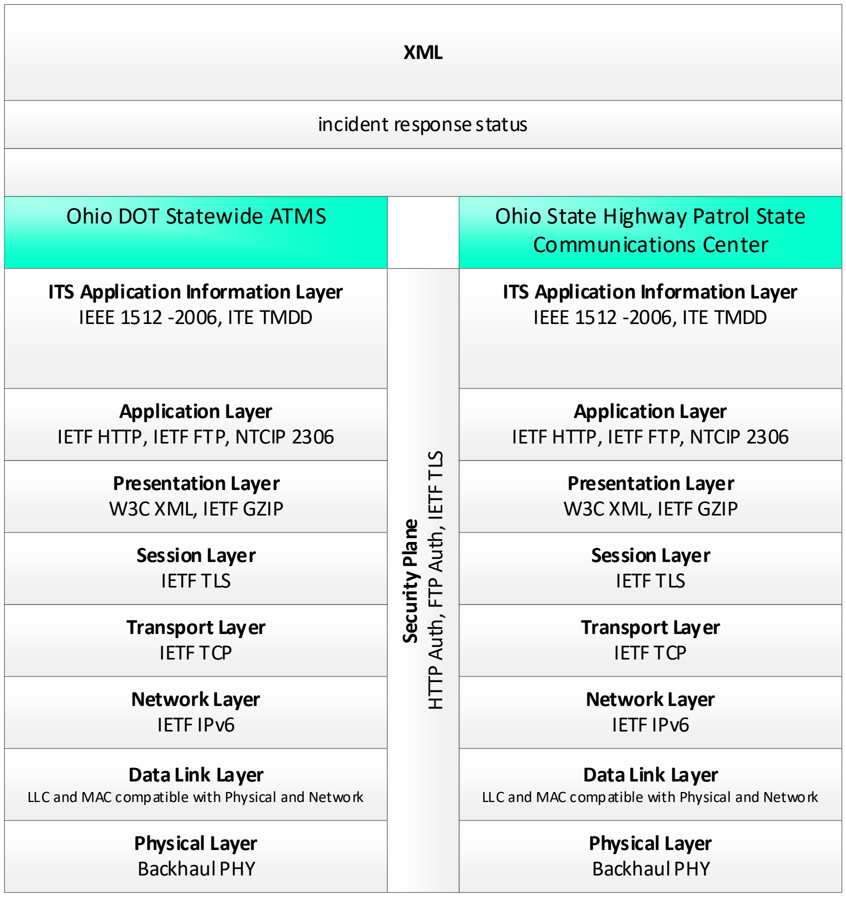
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 176 F: incident information / S: Ohio Statewide EOC/JDF -> D: Ohio DOT Statewide ATMS / P: XML



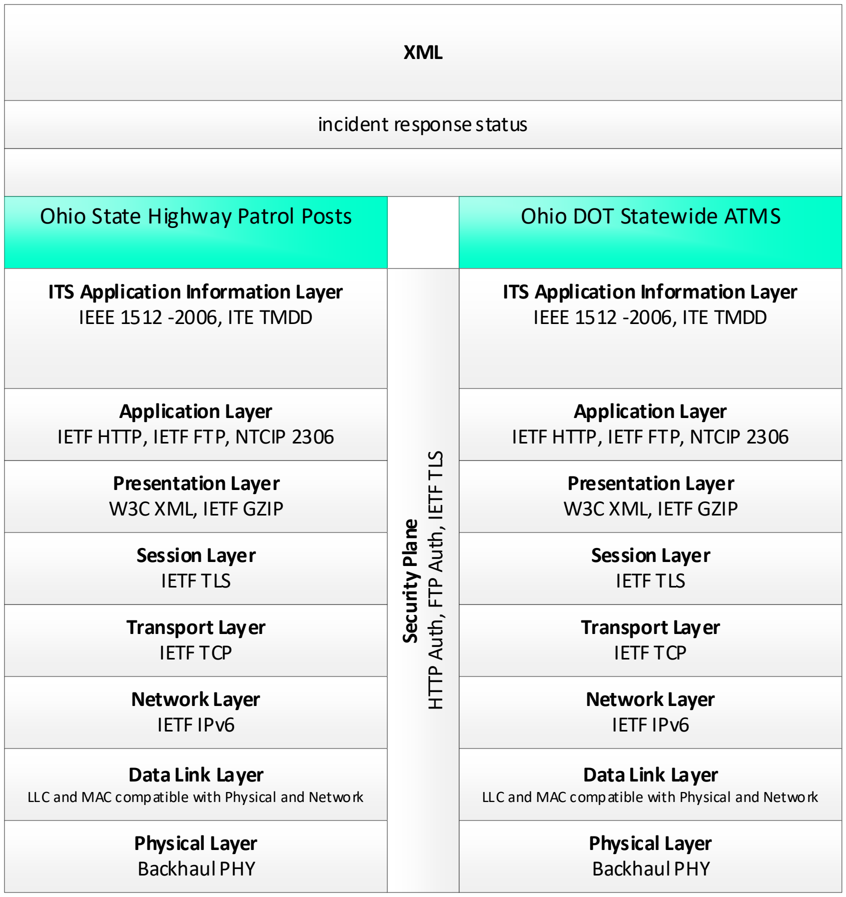
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 177 F: incident information / S: Ohio Turnpike Central Dispatch -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



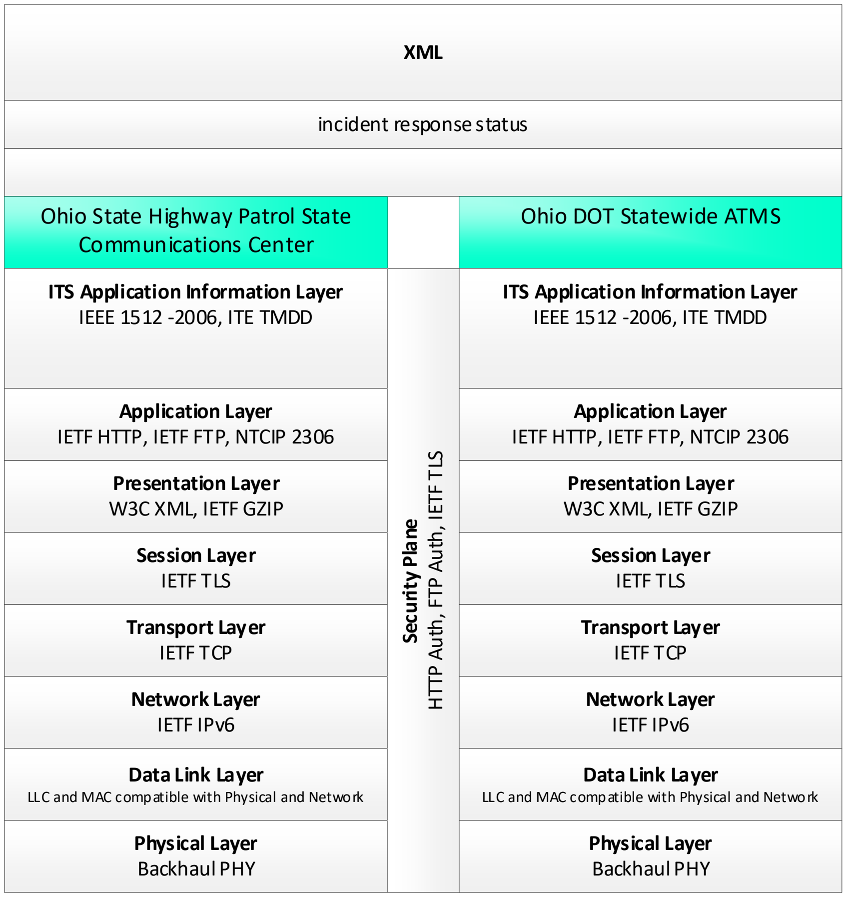
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 178 F: incident response status / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol State Communications Center / P: XML



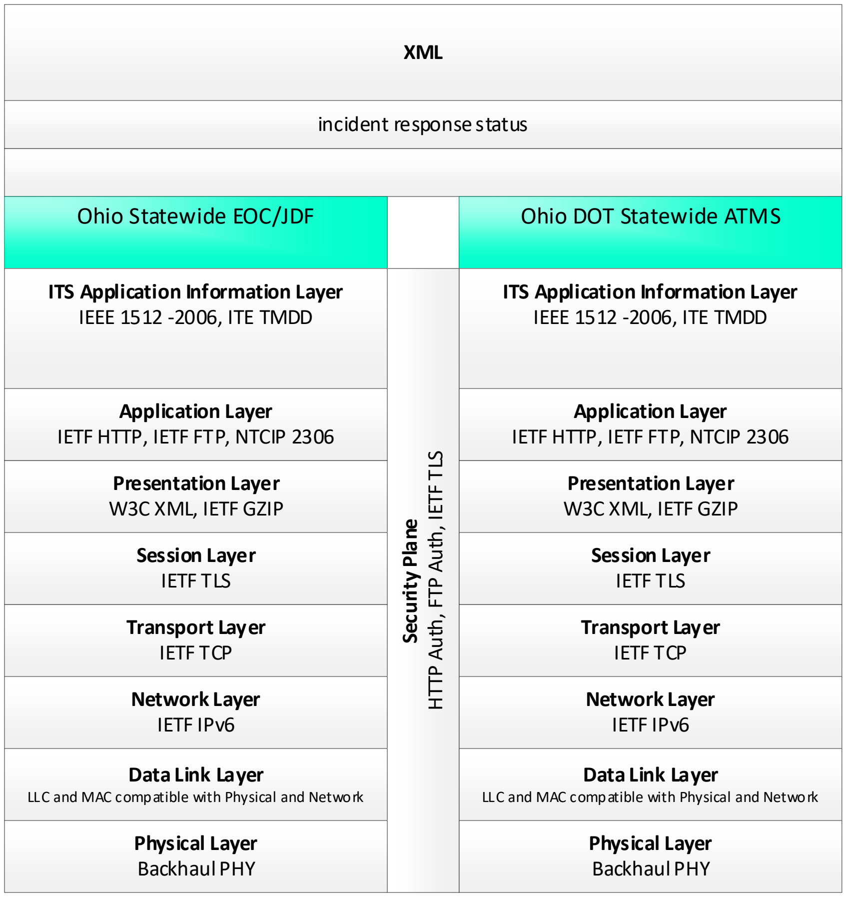
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 179 F: incident response status / S: Ohio State Highway Patrol Posts -> D: Ohio DOT Statewide ATMS / P: XML



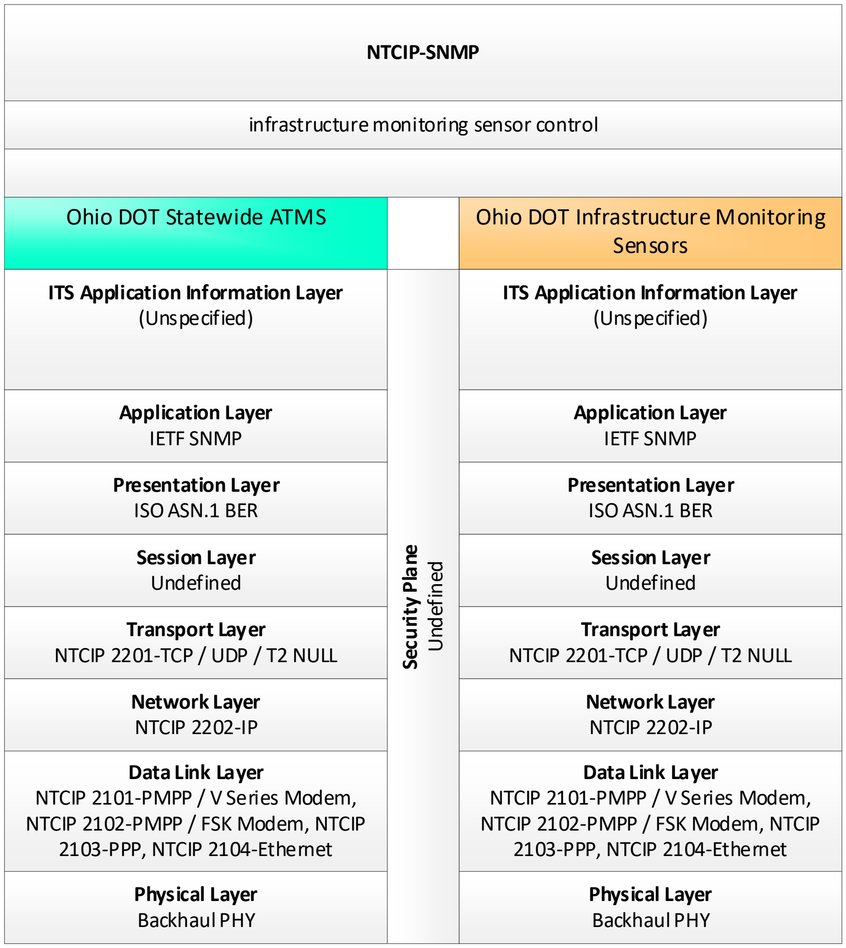
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 180 F: incident response status / S: Ohio State Highway Patrol State Communications Center -> D: Ohio DOT Statewide ATMS / P: XML



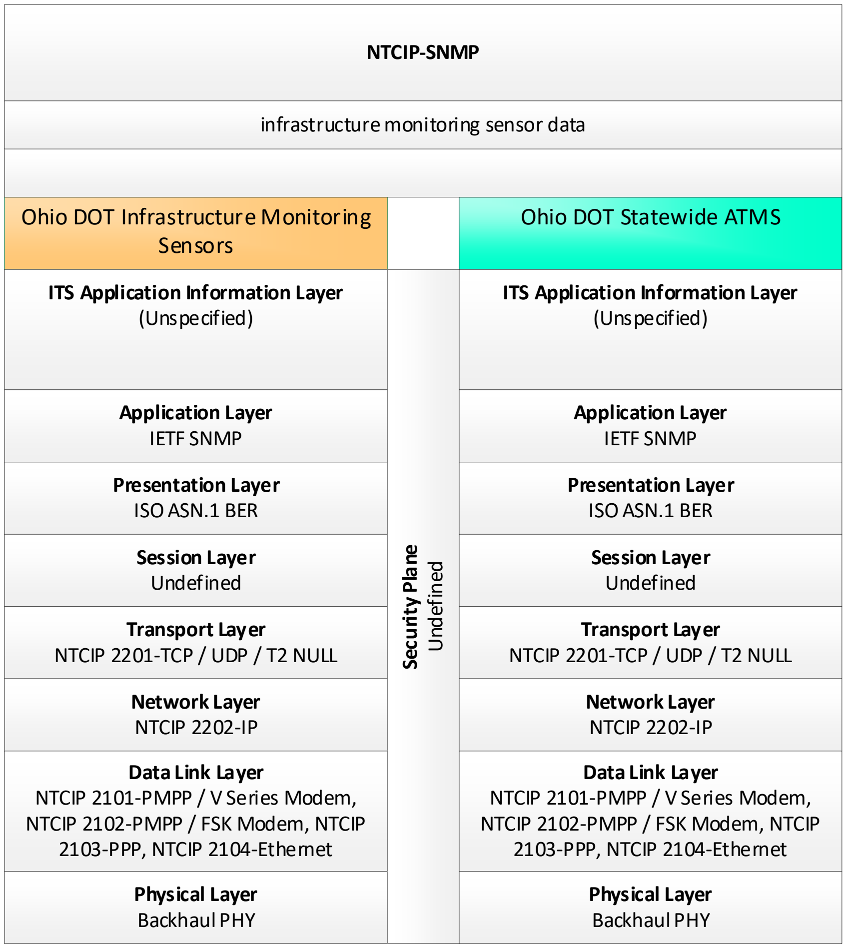
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 181 F: incident response status / S: Ohio Statewide EOC/JDF -> D: Ohio DOT Statewide ATMS / P: XML



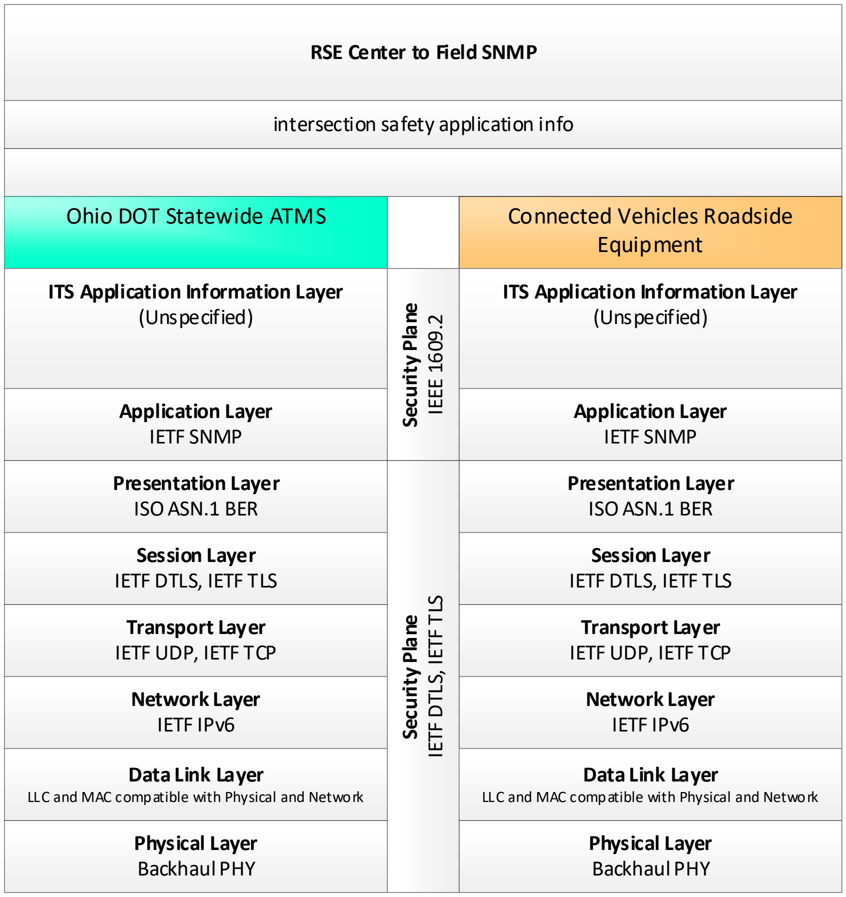
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 182 F: infrastructure monitoring sensor control / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Infrastructure Monitoring Sensors / P: NTCIP-SNMP



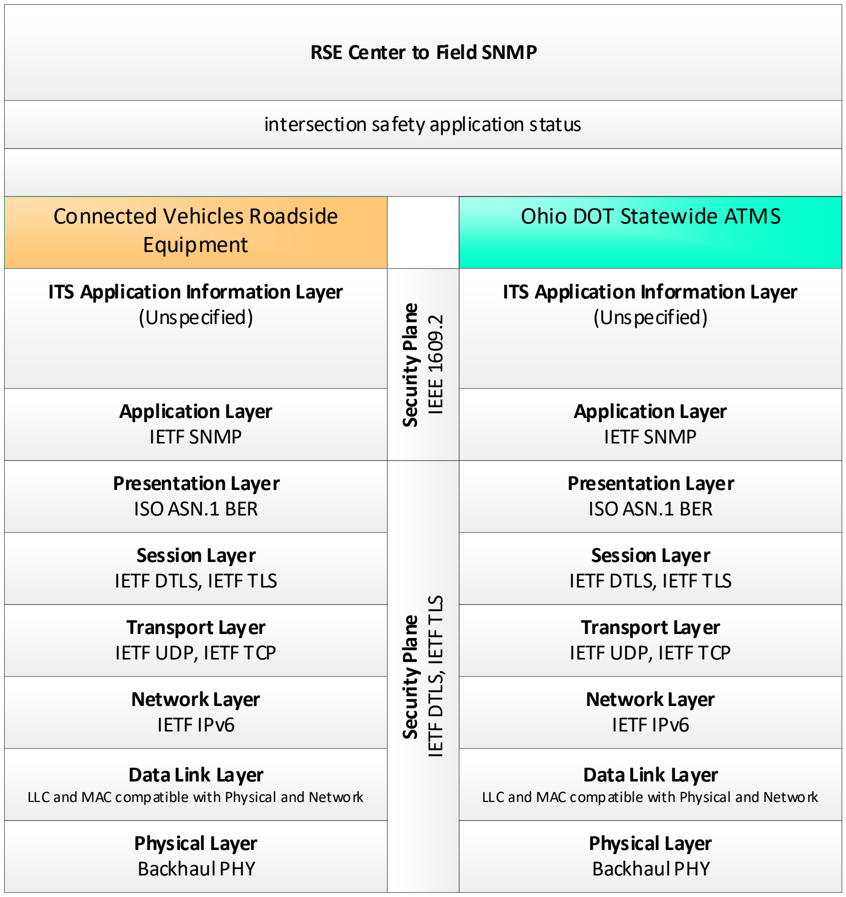
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 183 F: infrastructure monitoring sensor data / S: Ohio DOT Infrastructure Monitoring Sensors -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP



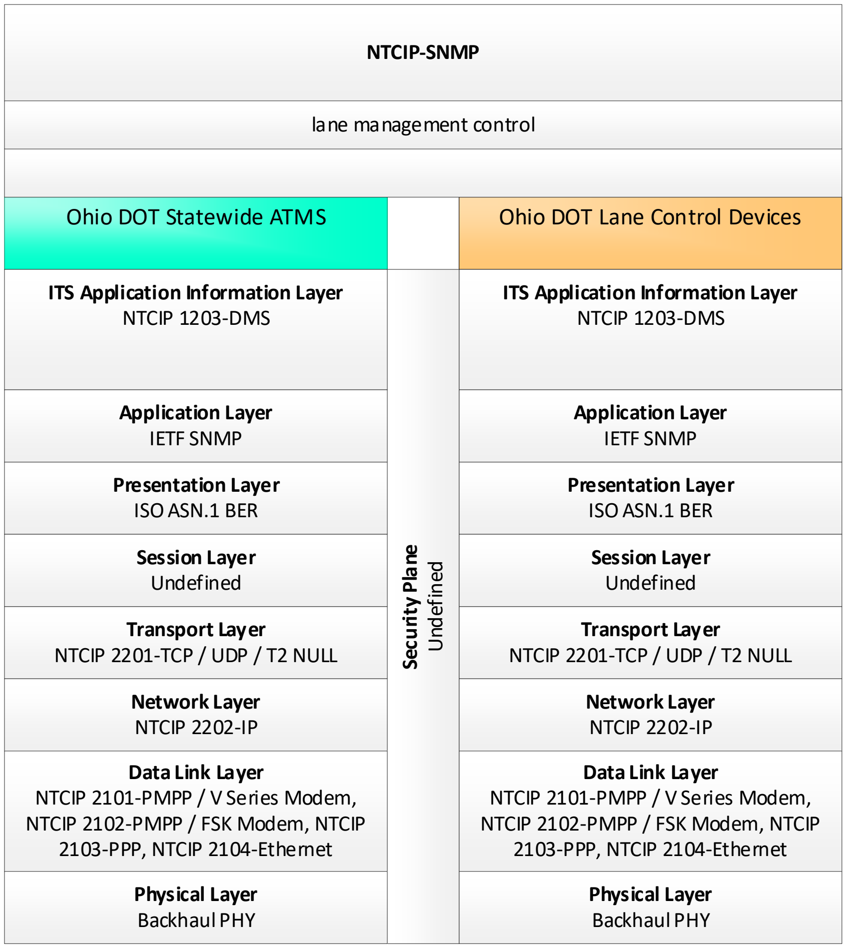
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 184 F: intersection safety application info / S: Ohio DOT Statewide ATMS -> D: Connected Vehicles Roadside Equipment / P: RSE-C2F-SNMP



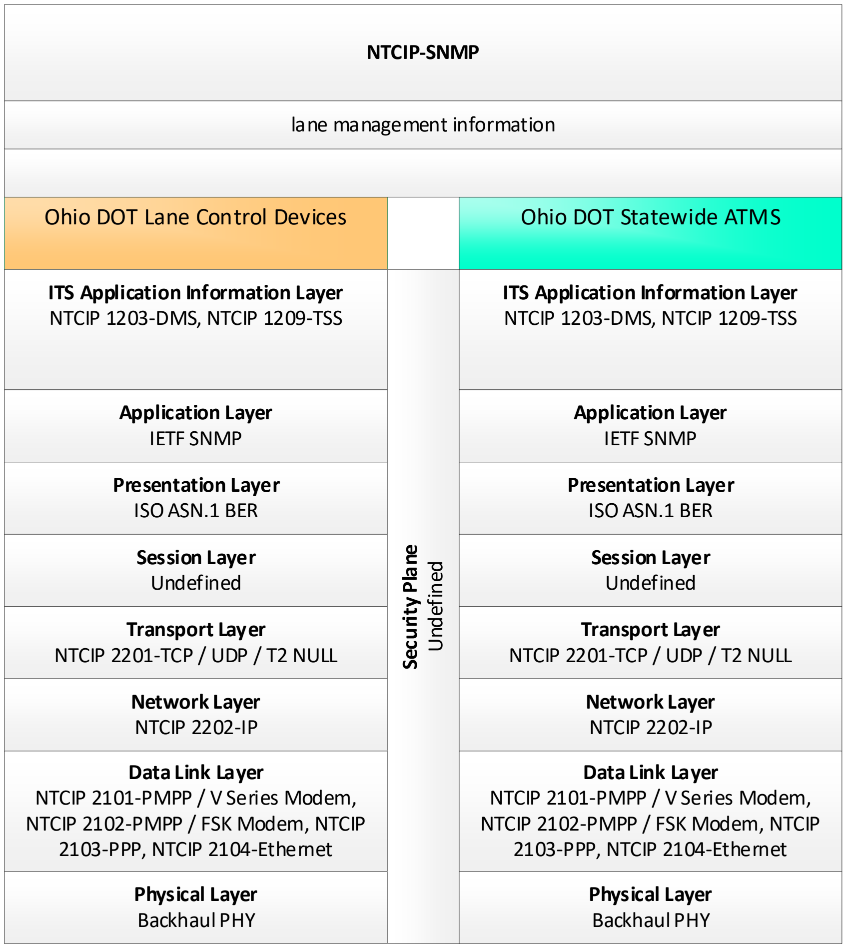
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 185 F: intersection safety application status / S: Connected Vehicles Roadside Equipment -> D: Ohio DOT Statewide ATMS / P: RSE-C2F-SNMP



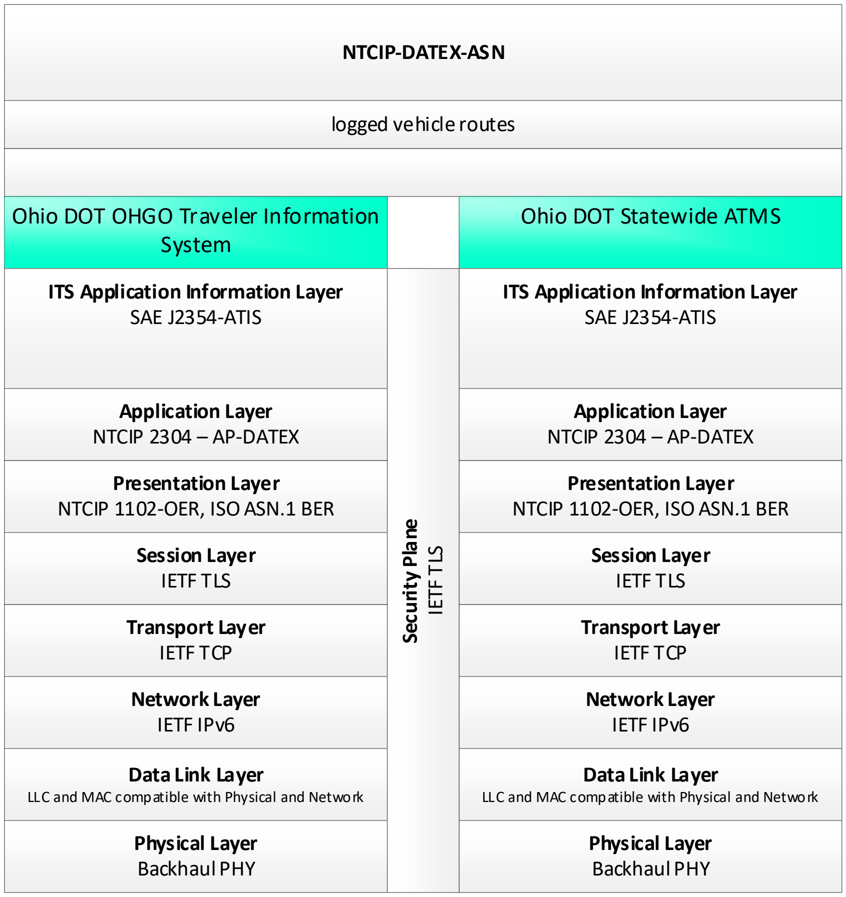
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 186 F: lane management control / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Lane Control Devices / P: NTCIP-SNMP



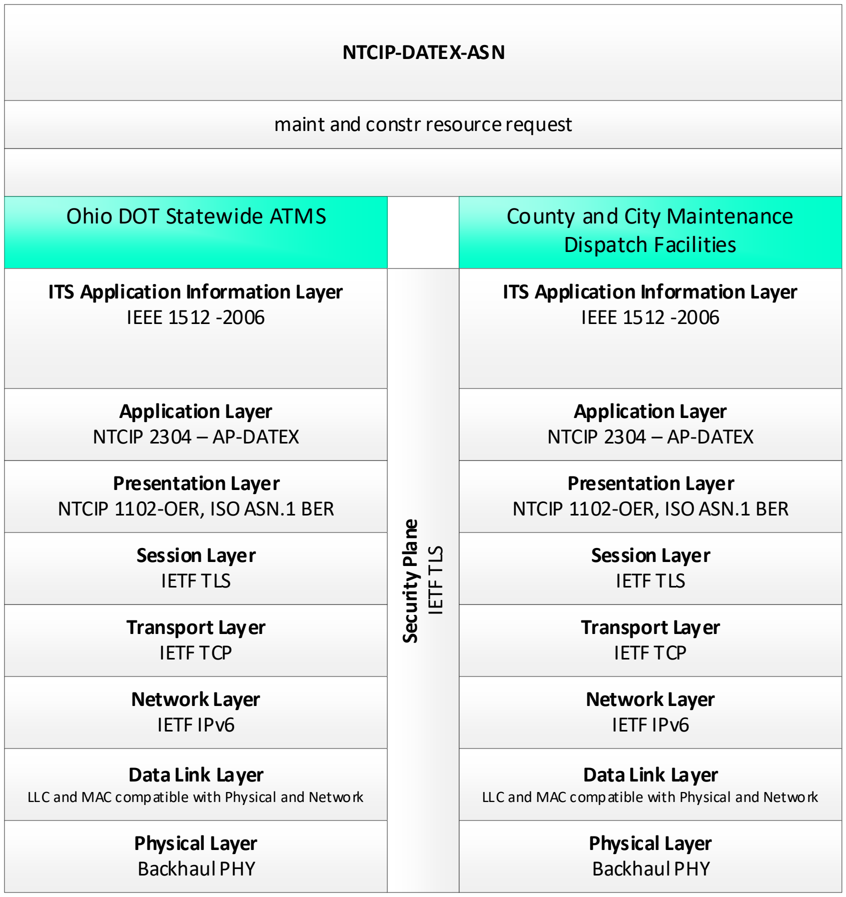
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 187 F: lane management information / S: Ohio DOT Lane Control Devices -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP



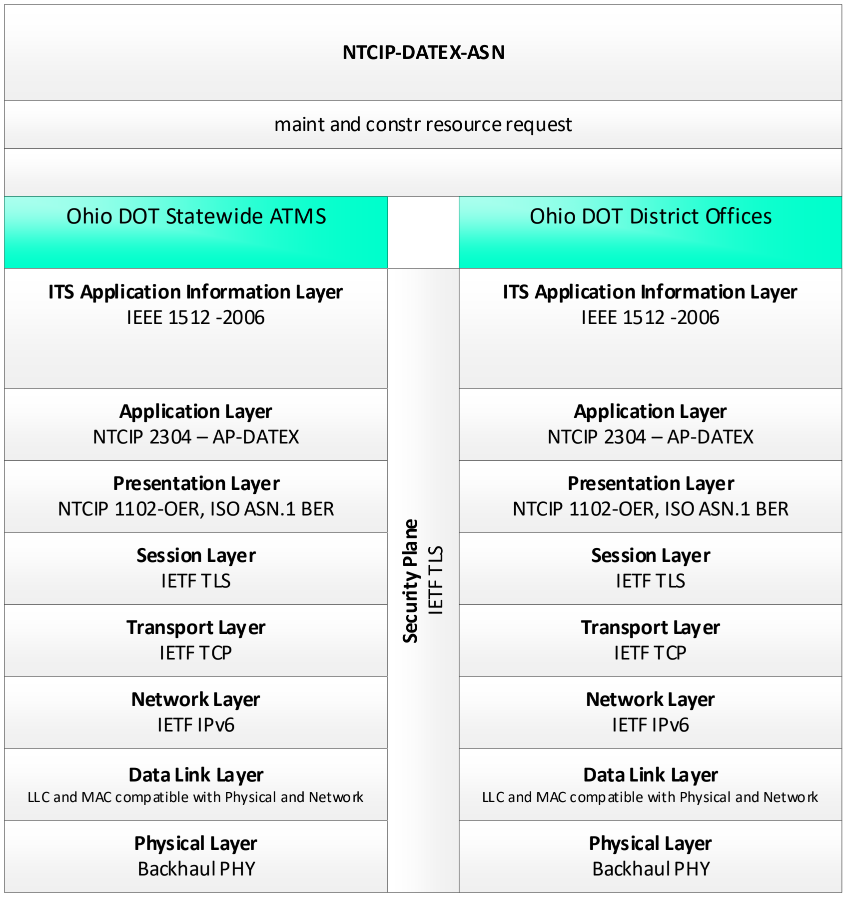
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 188 F: logged vehicle routes / S: Ohio DOT OHGO Traveler Information System -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



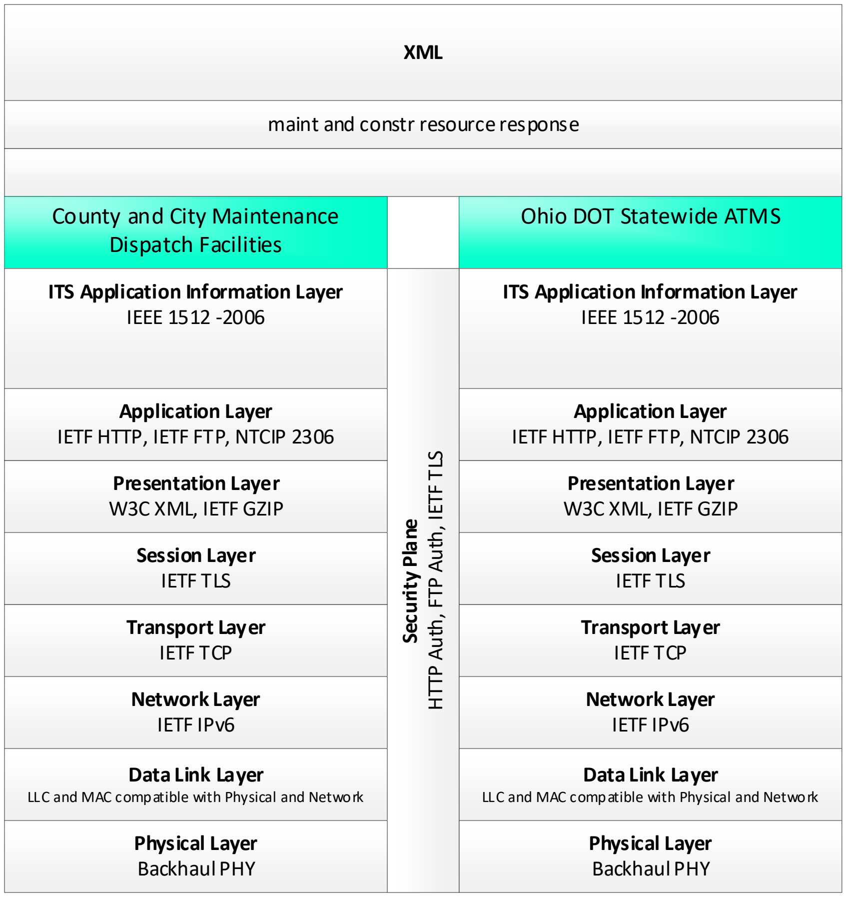
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 189 F: maint and constr resource request / S: Ohio DOT Statewide ATMS -> D: County and City Maintenance Dispatch Facilities / P: XML



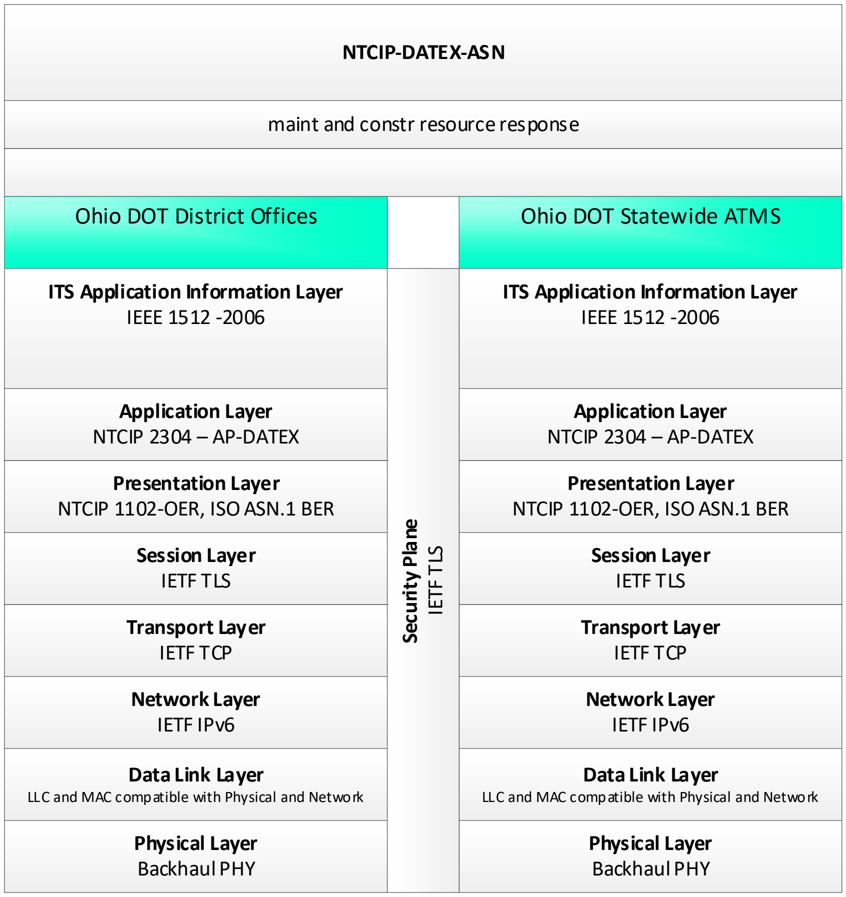
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 190 F: maint and constr resource request / S: Ohio DOT Statewide ATMS -> D: Ohio DOT District Offices / P: NTCIP-DATEX



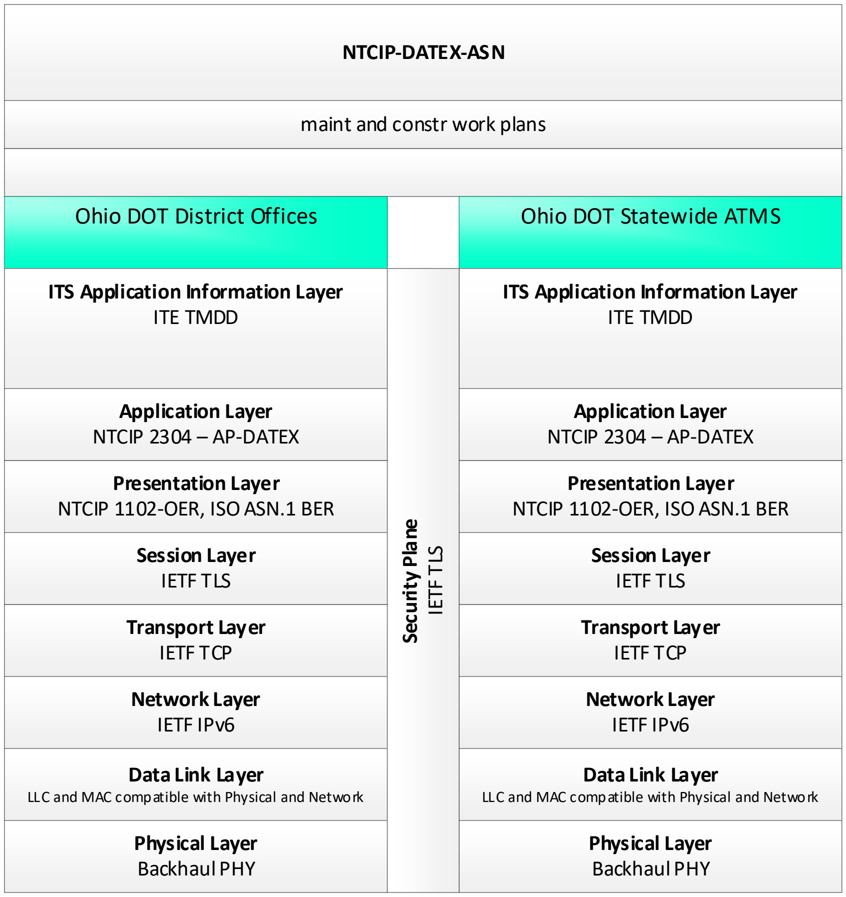
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 191 F: maint and constr resource response / S: County and City Maintenance Dispatch Facilities -> D: Ohio DOT Statewide ATMS / P: XML



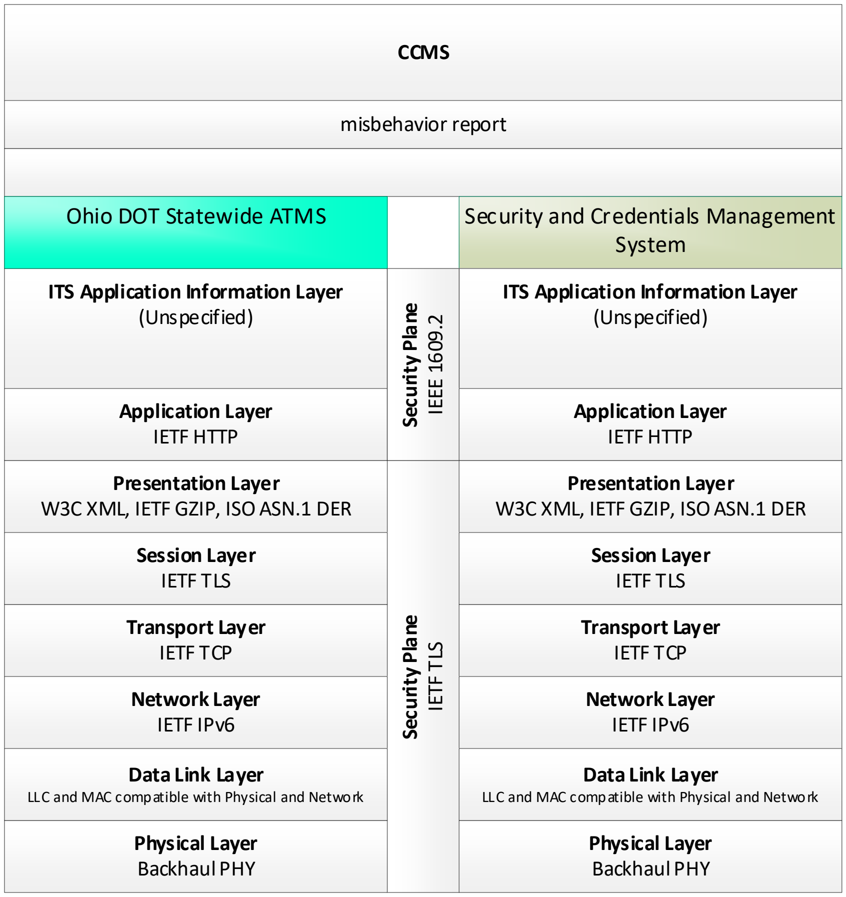
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 192 F: maint and constr resource response / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 193 F: maint and constr work plans / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



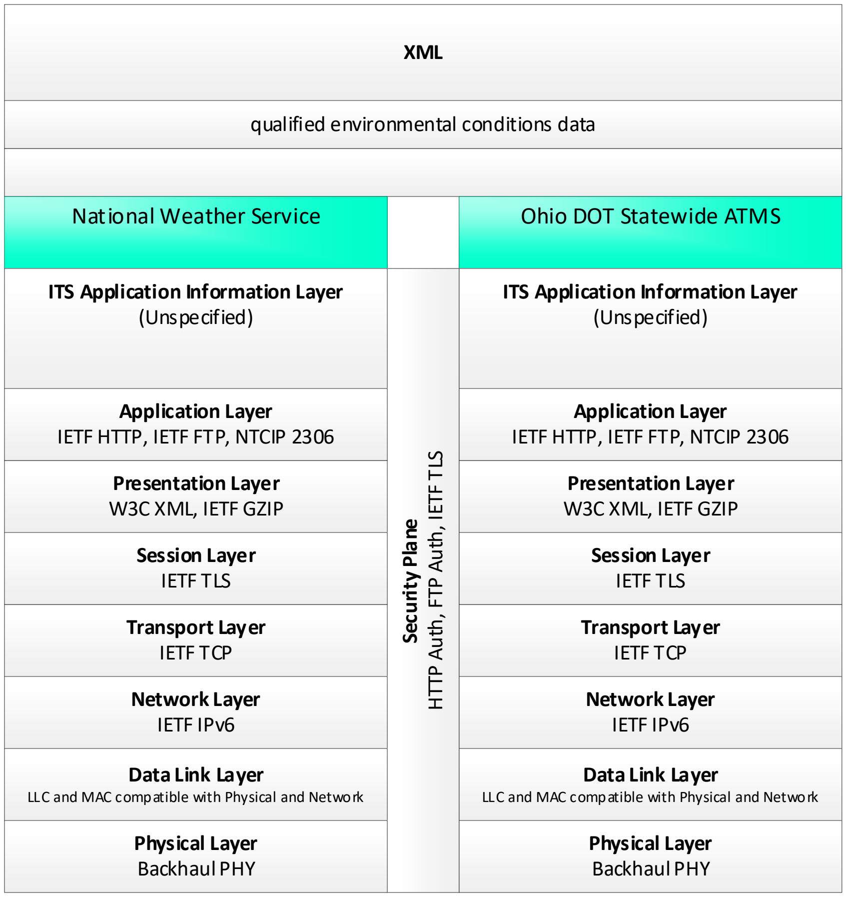
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 194 F: misbehavior report / S: Ohio DOT Statewide ATMS -> D: Security and Credentials Management System / P: CCMS

NTCIP-DATEX-ASN		
parking information		
Ohio DOT Rest Area Truck Parking Availability System		Ohio DOT Statewide ATMS
ITS Application Information Layer SAE J2354-ATIS	**Security Plane** IETF TLS	**ITS Application Information Layer** SAE J2354-ATIS
Application Layer NTCIP 2304 – AP-DATEX		**Application Layer** NTCIP 2304 – AP-DATEX
Presentation Layer NTCIP 1102-OER, ISO ASN.1 BER		**Presentation Layer** NTCIP 1102-OER, ISO ASN.1 BER
Session Layer IETF TLS		**Session Layer** IETF TLS
Transport Layer IETF TCP		**Transport Layer** IETF TCP
Network Layer IETF IPv6		**Network Layer** IETF IPv6
Data Link Layer LLC and MAC compatible with Physical and Network		**Data Link Layer** LLC and MAC compatible with Physical and Network
Physical Layer Backhaul PHY		**Physical Layer** Backhaul PHY

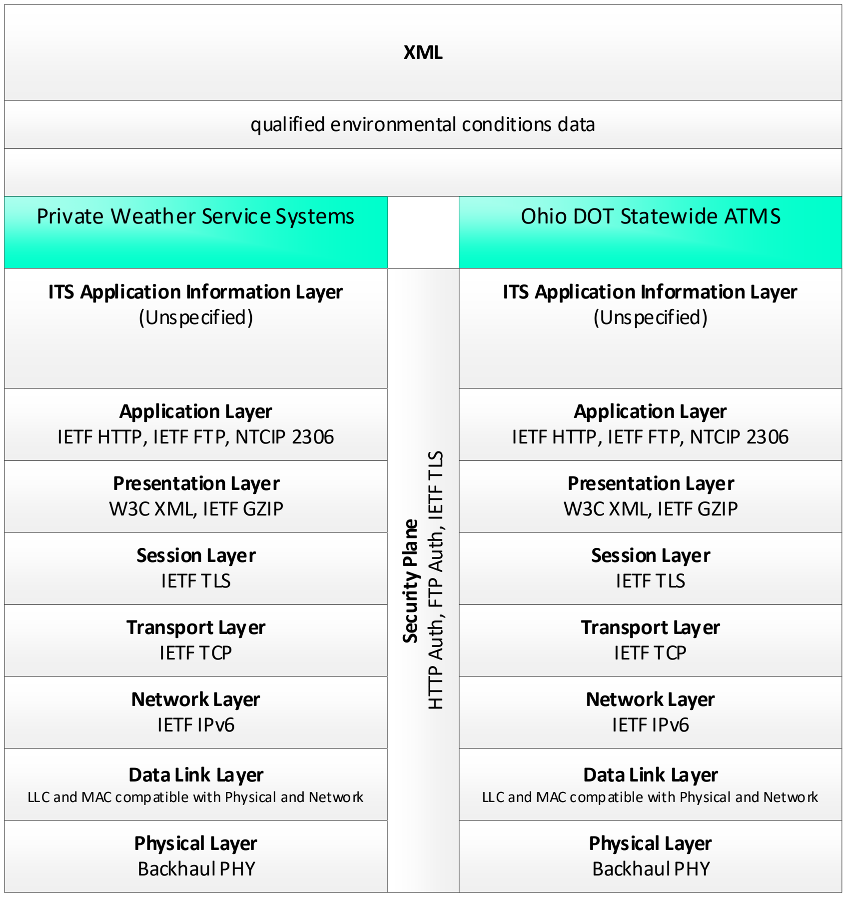
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 195 F: parking information / S: Ohio DOT Rest Area Truck Parking Availability System -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



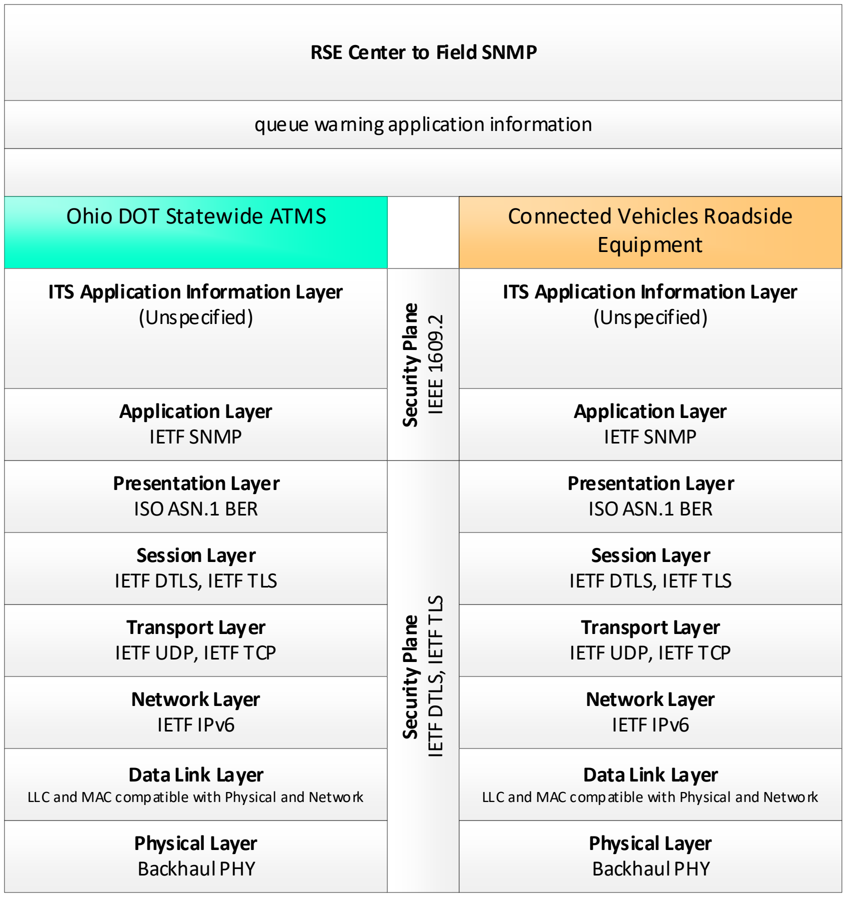
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 196 F: qualified environmental conditions data / S: National Weather Service -> D: Ohio DOT Statewide ATMS / P: XML



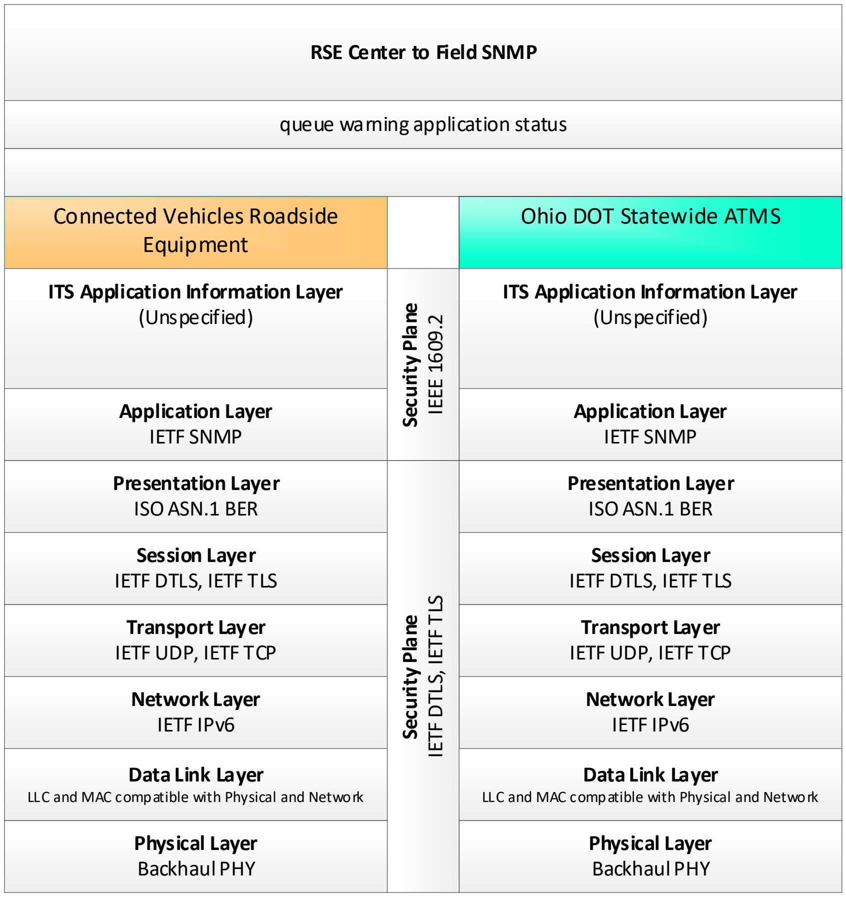
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 197 F: qualified environmental conditions data / S: Private Weather Service Systems -> D: Ohio DOT Statewide ATMS / P: XML



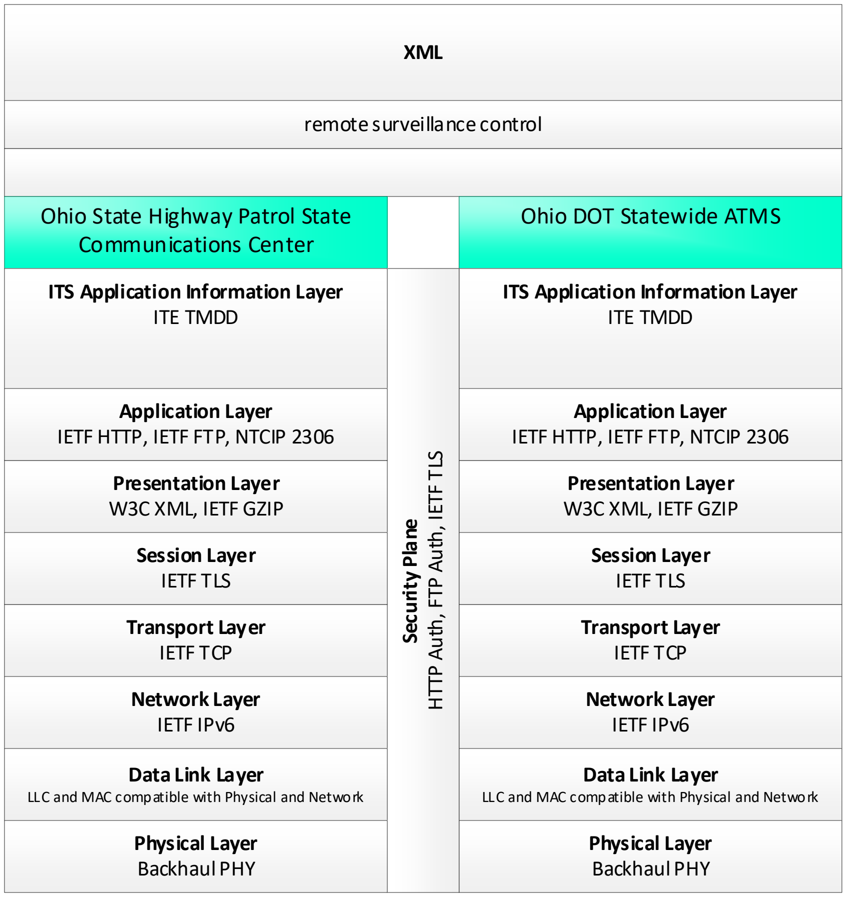
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 198 F: queue warning application information / S: Ohio DOT Statewide ATMS -> D: Connected Vehicles Roadside Equipment / P: RSE-C2F-SNMP



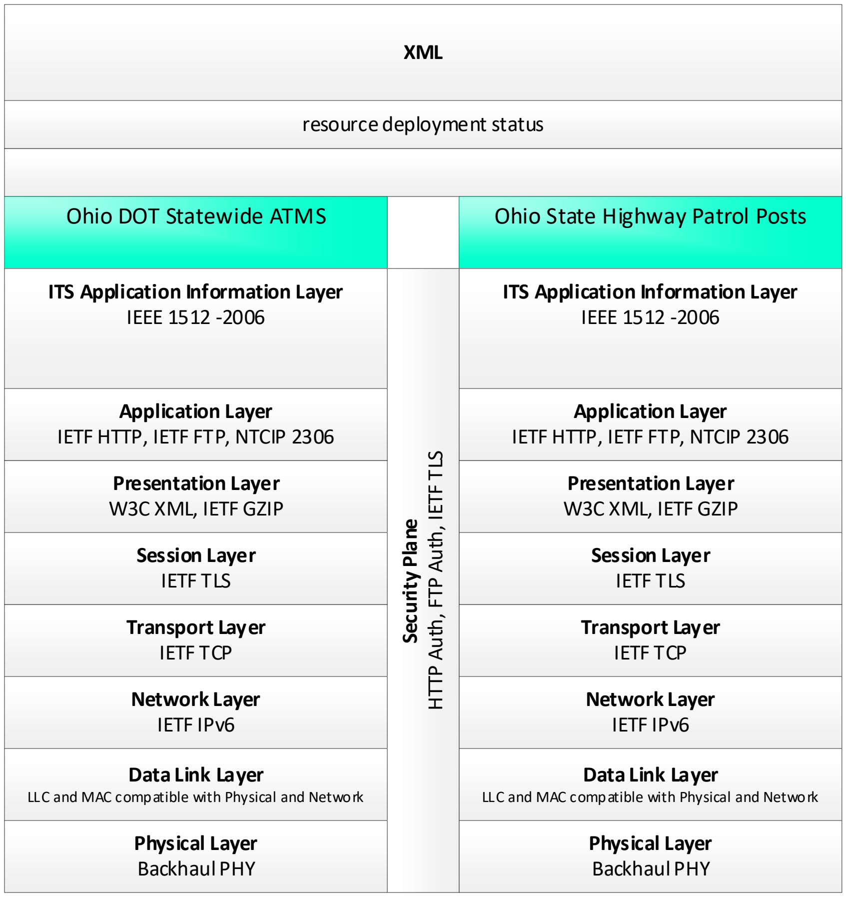
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 199 F: queue warning application status / S: Connected Vehicles Roadside Equipment -> D: Ohio DOT Statewide ATMS / P: RSE-C2F-SNMP



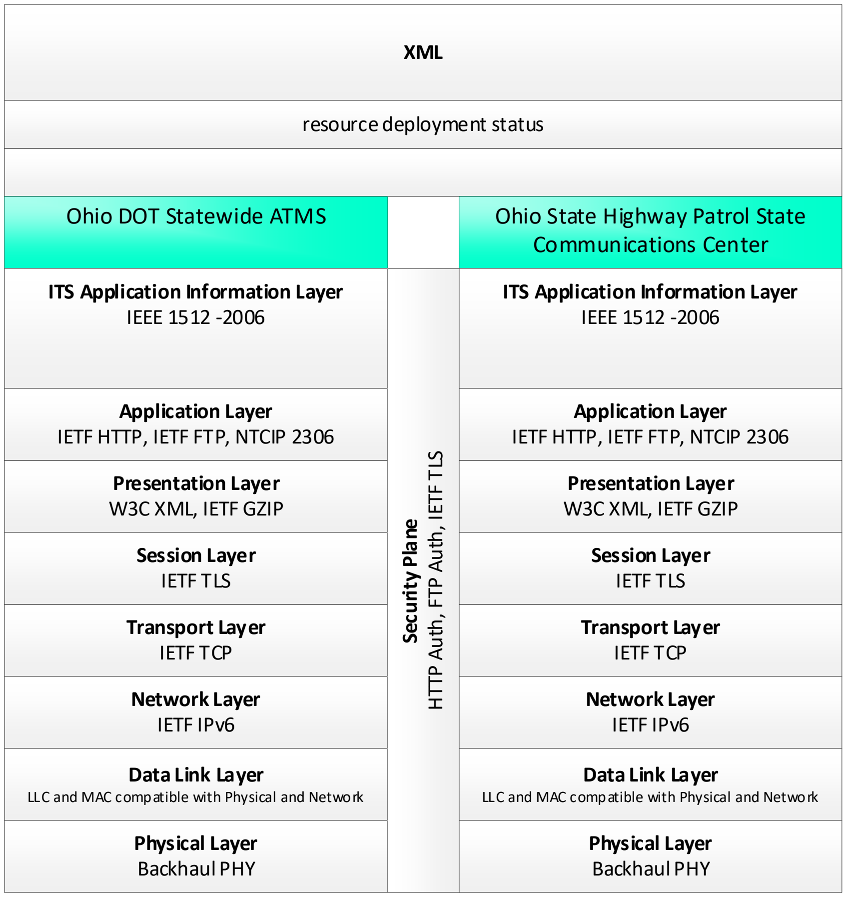
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 200 F: remote surveillance control / S: Ohio State Highway Patrol State Communications Center -> D: Ohio DOT Statewide ATMS / P: XML



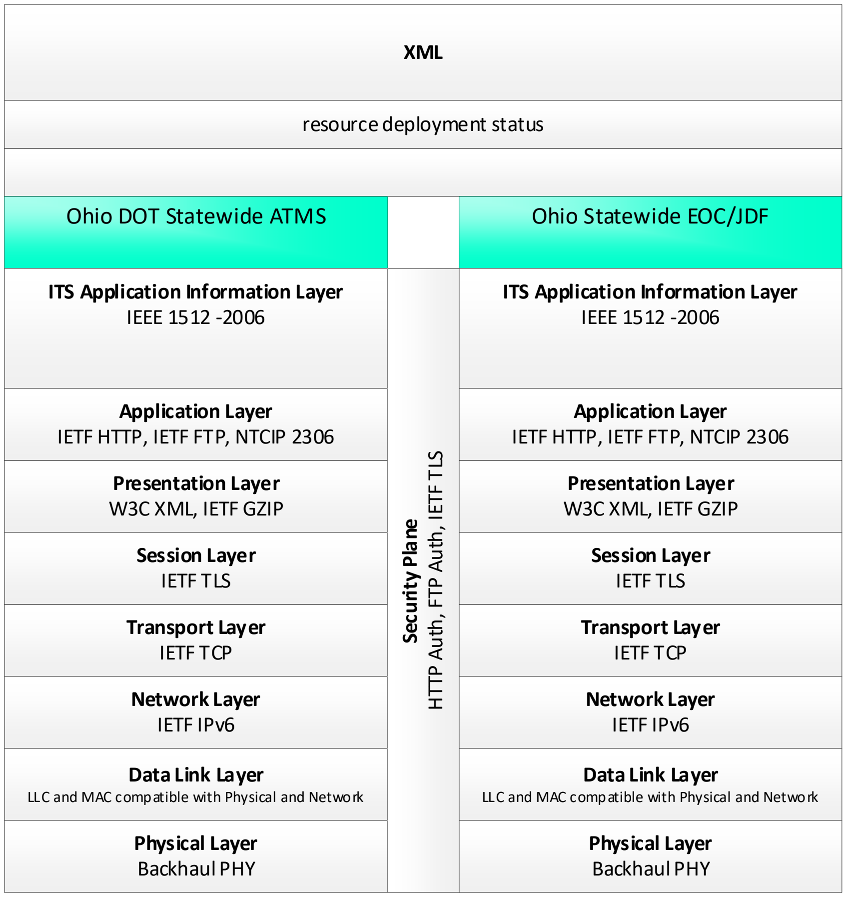
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 201 F: resource deployment status / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol Posts / P: XML



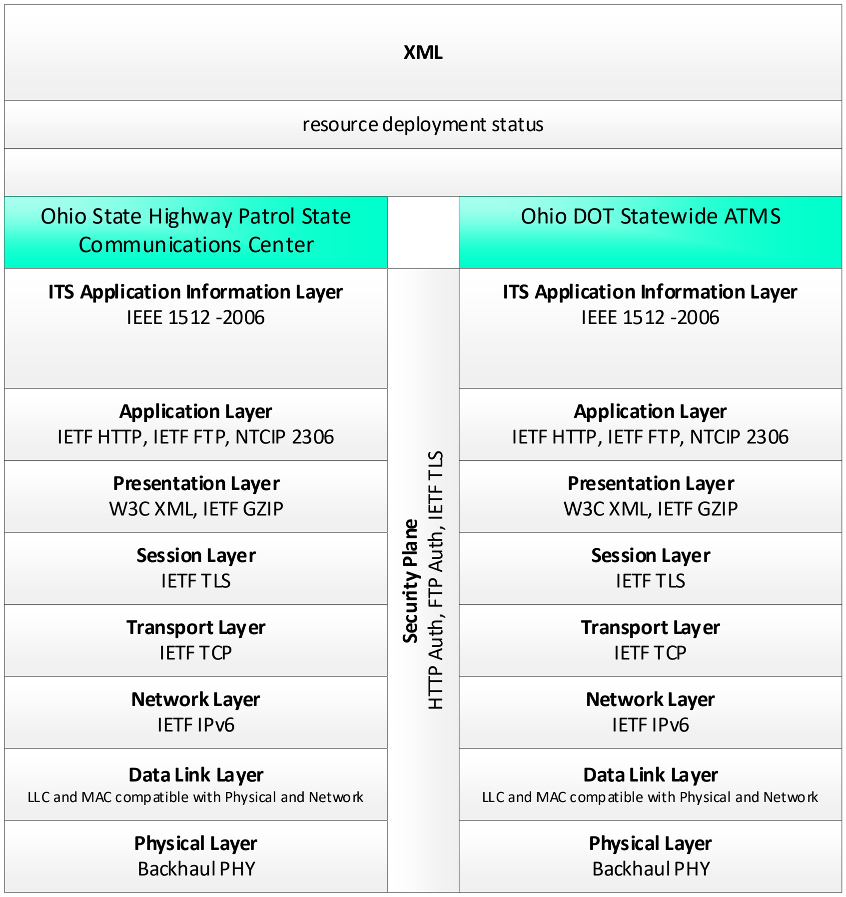
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 202 F: resource deployment status / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol State Communications Center / P: XML



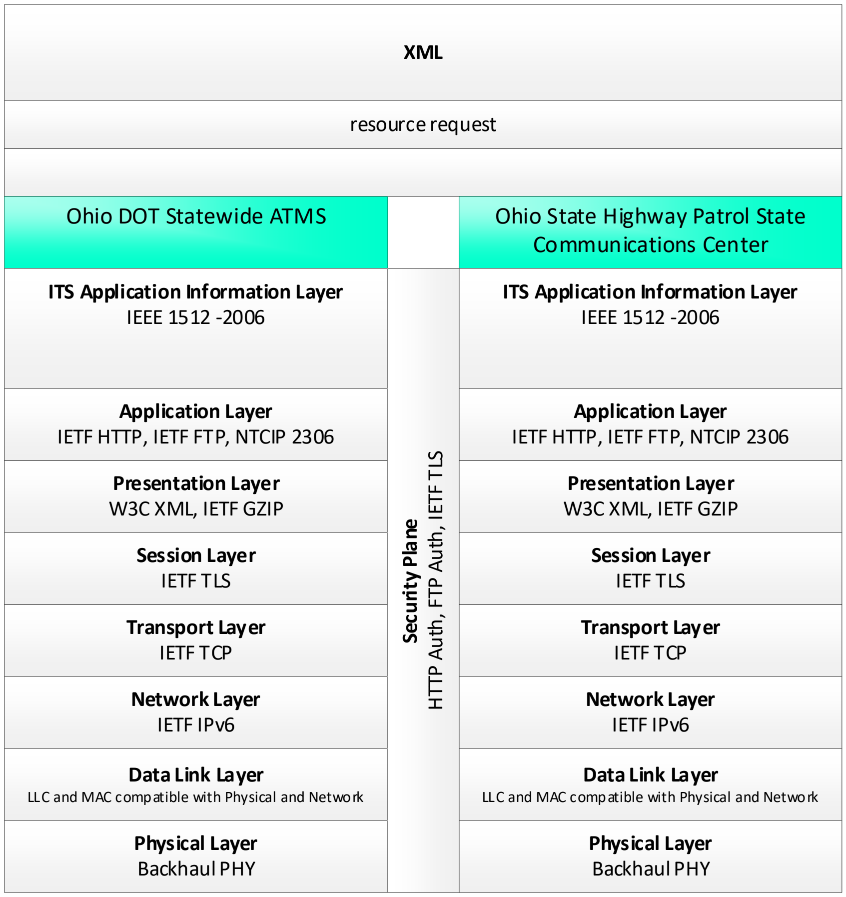
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 203 F: resource deployment status / S: Ohio DOT Statewide ATMS -> D: Ohio Statewide EOC/JDF / P: XML



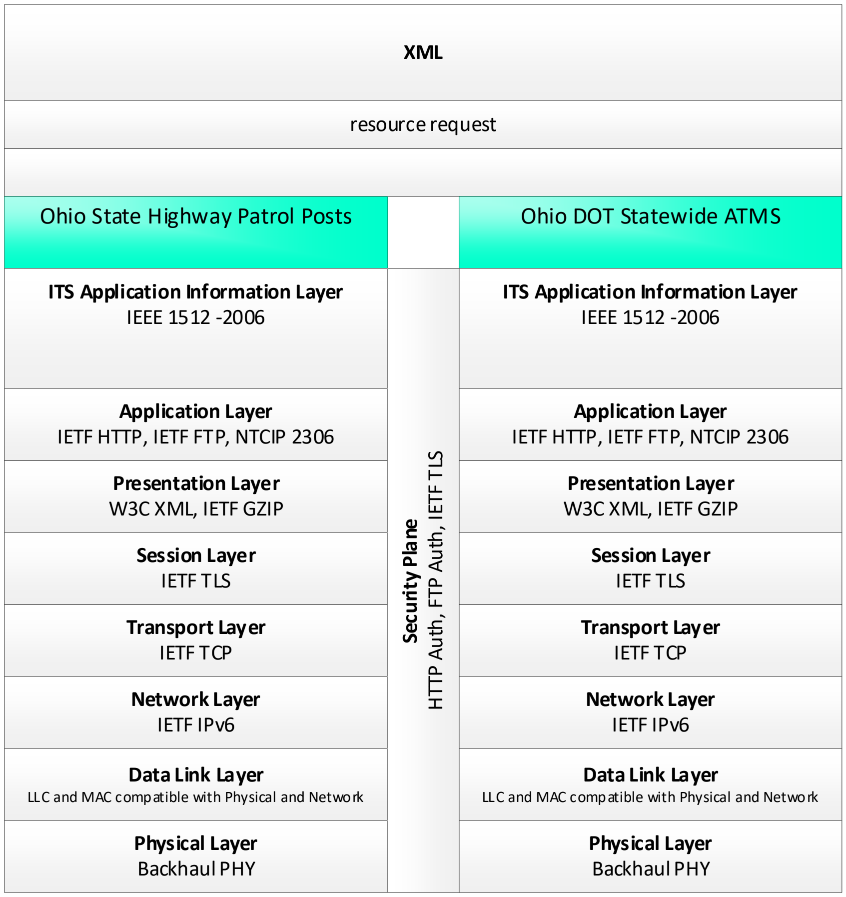
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 204 F: resource deployment status / S: Ohio State Highway Patrol State Communications Center -> D: Ohio DOT Statewide ATMS / P: XML



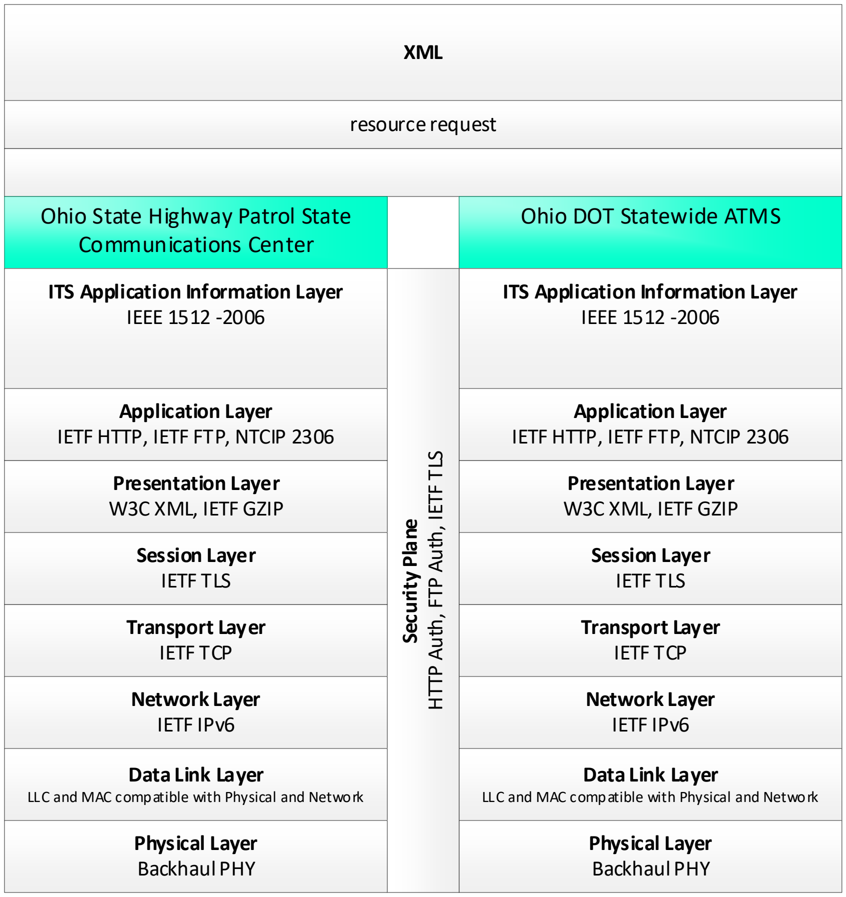
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 205 F: resource request / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol State Communications Center / P: XML



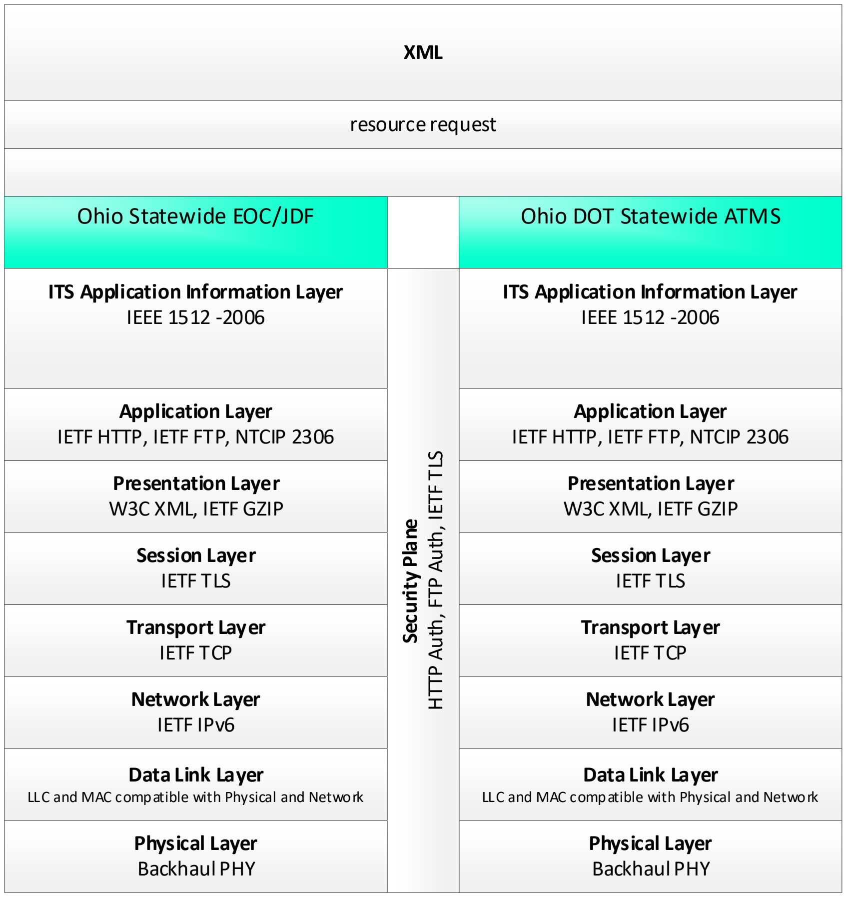
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 206 F: resource request / S: Ohio State Highway Patrol Posts -> D: Ohio DOT Statewide ATMS / P: XML



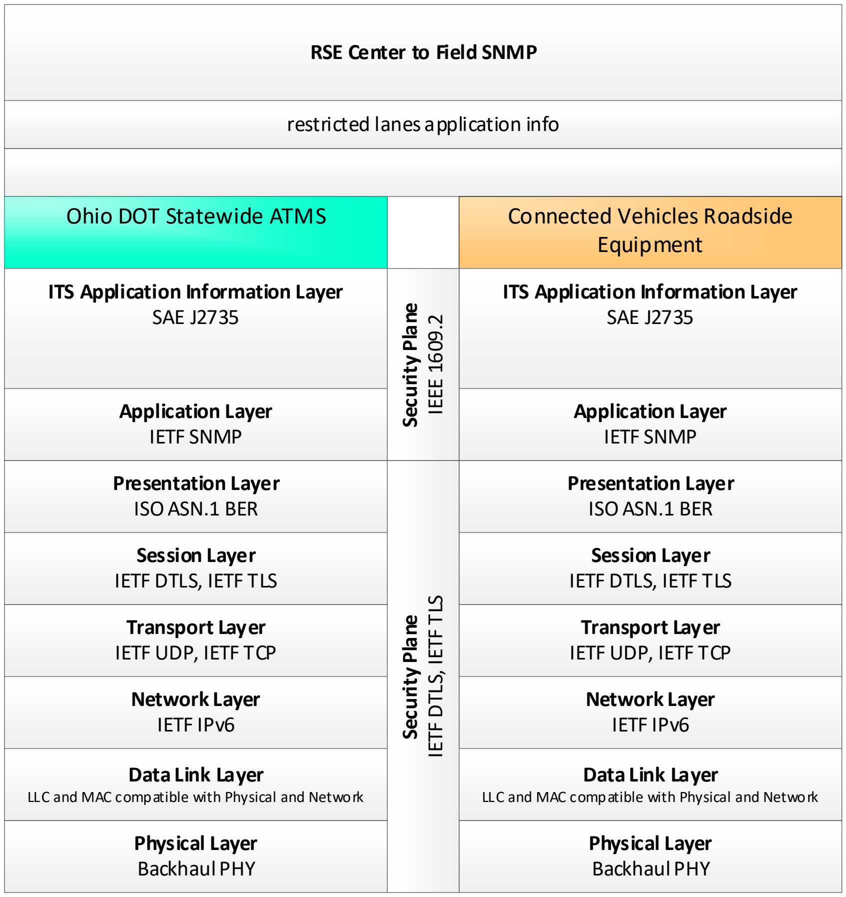
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 207 F: resource request / S: Ohio State Highway Patrol State Communications Center -> D: Ohio DOT Statewide ATMS / P: XML



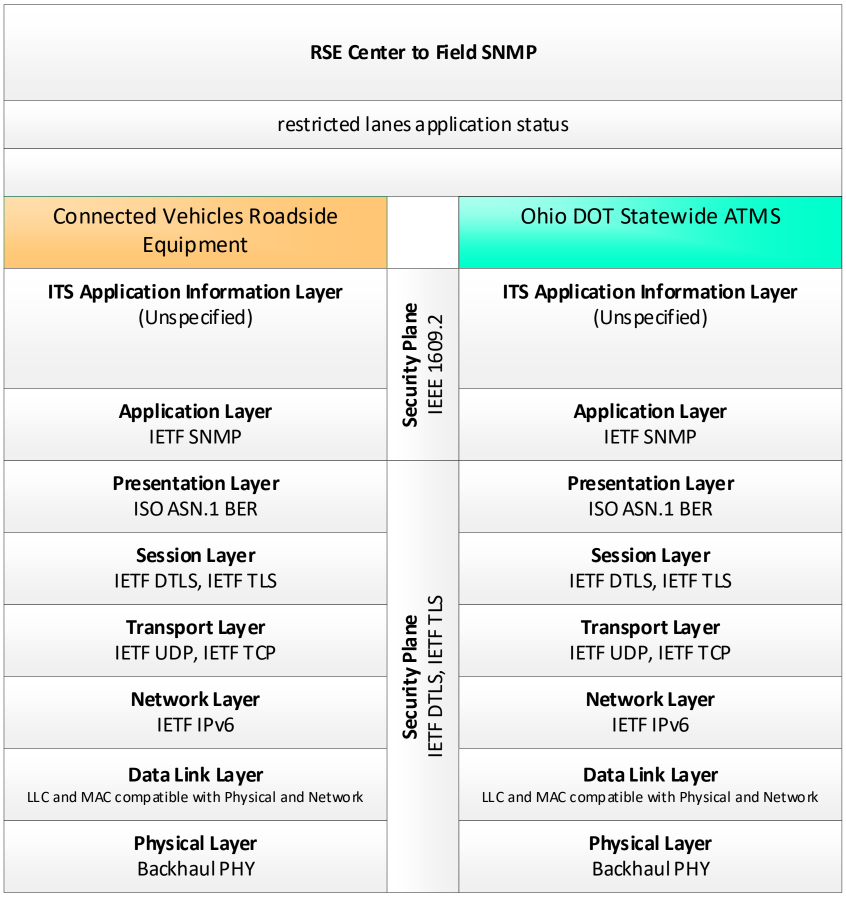
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 208 F: resource request / S: Ohio Statewide EOC/JDF -> D: Ohio DOT Statewide ATMS / P: XML



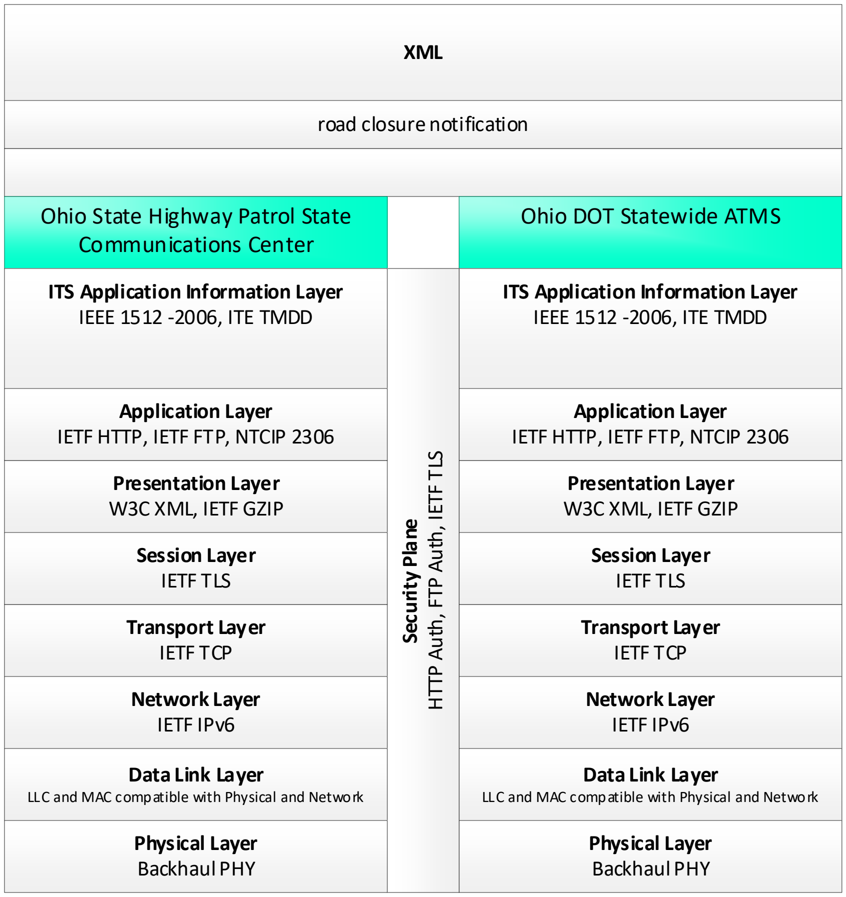
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 209 F: restricted lanes application info / S: Ohio DOT Statewide ATMS -> D: Connected Vehicles Roadside Equipment / P: RSE-C2F-SNMP



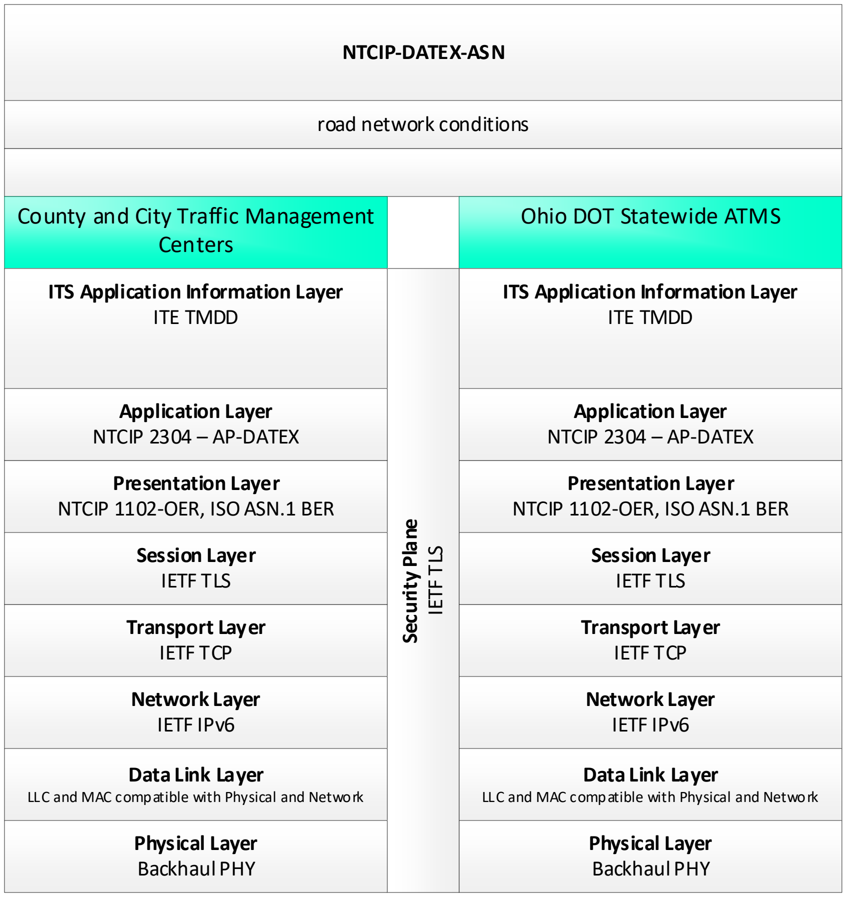
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 210 F: restricted lanes application status / S: Connected Vehicles Roadside Equipment -> D: Ohio DOT Statewide ATMS / P: RSE-C2F-SNMP



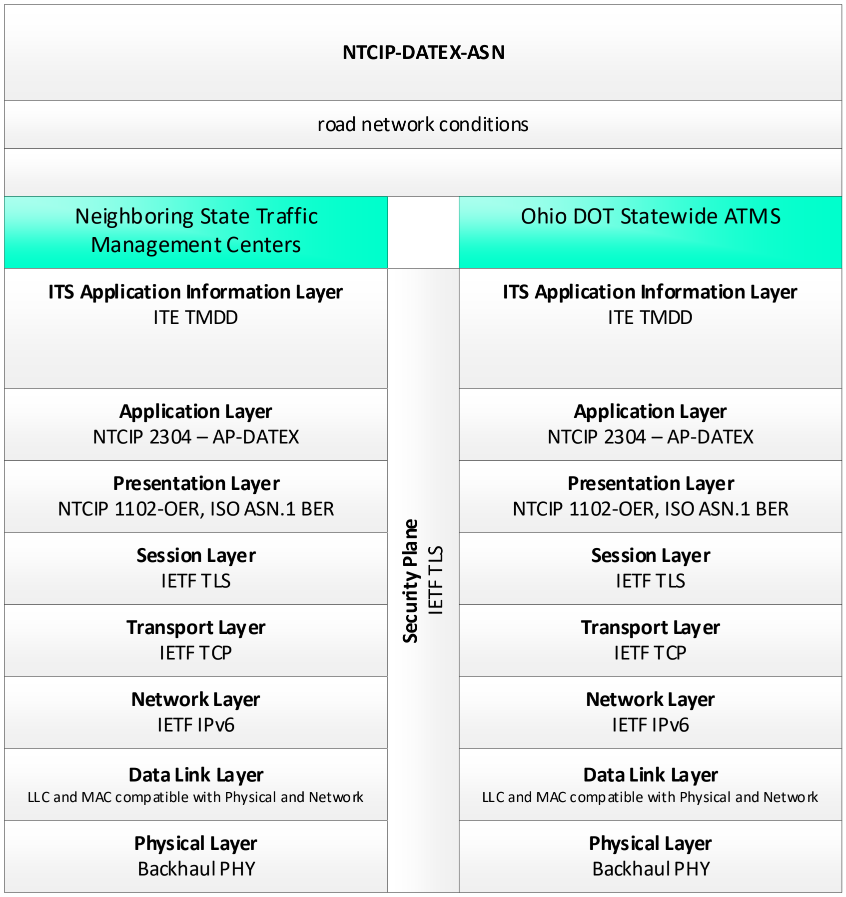
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 211 F: road closure notification / S: Ohio State Highway Patrol State Communications Center -> D: Ohio DOT Statewide ATMS / P: XML



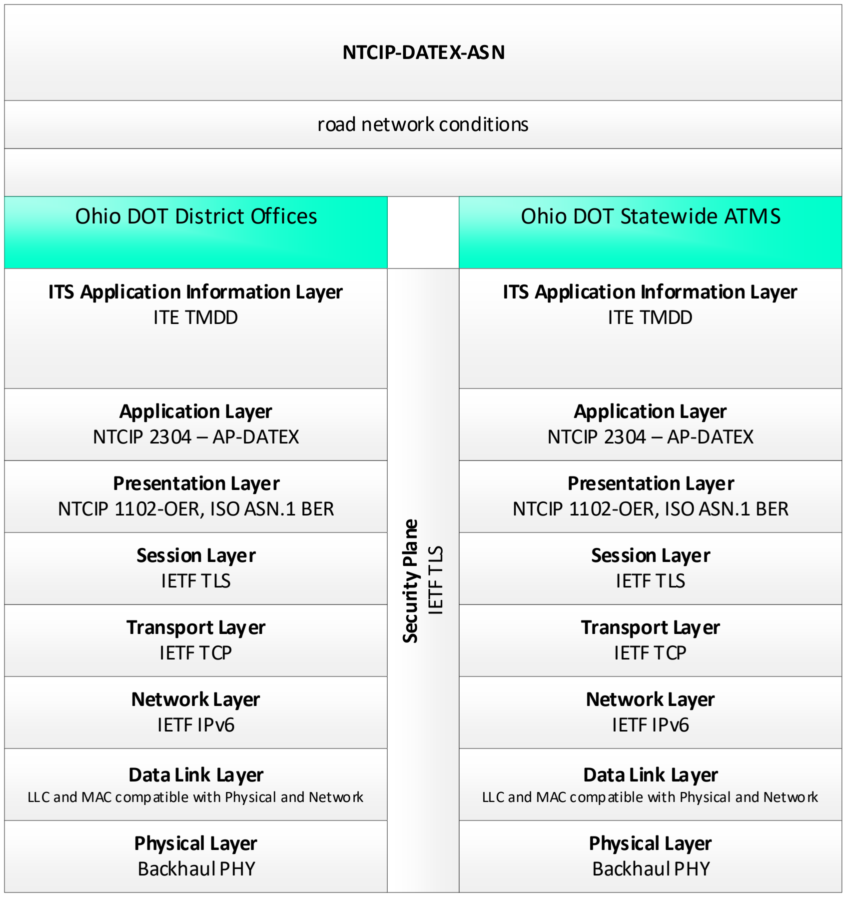
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 212 F: road network conditions / S: County and City Traffic Management Centers -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



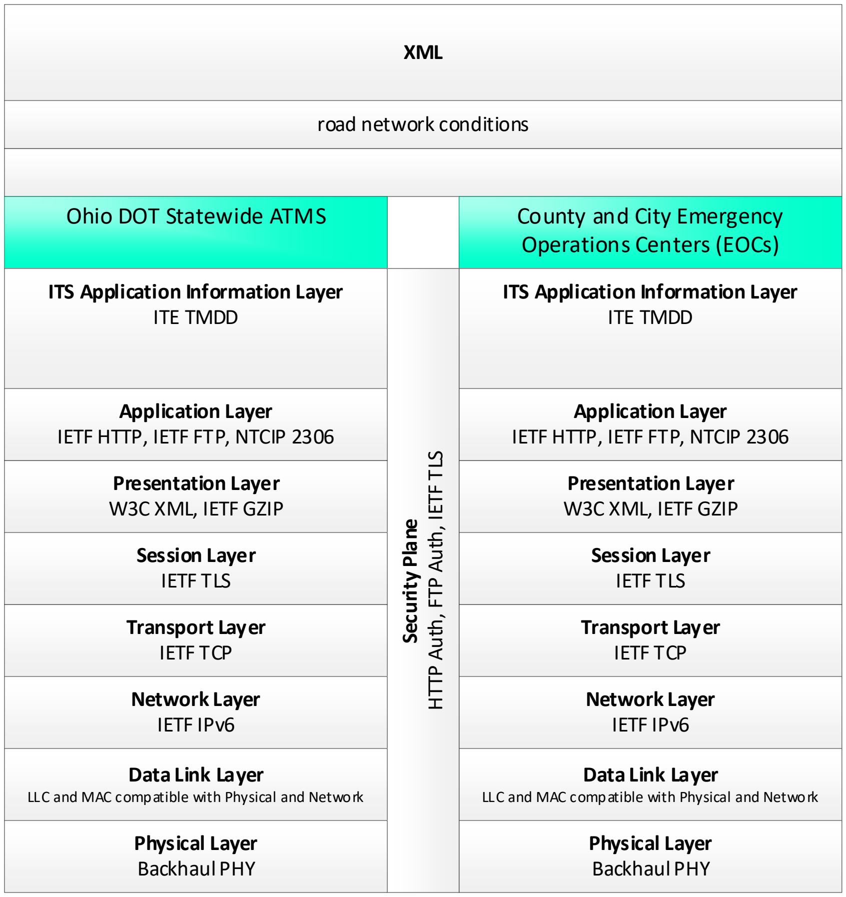
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 213 F: road network conditions / S: Neighboring State Traffic Management Centers -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



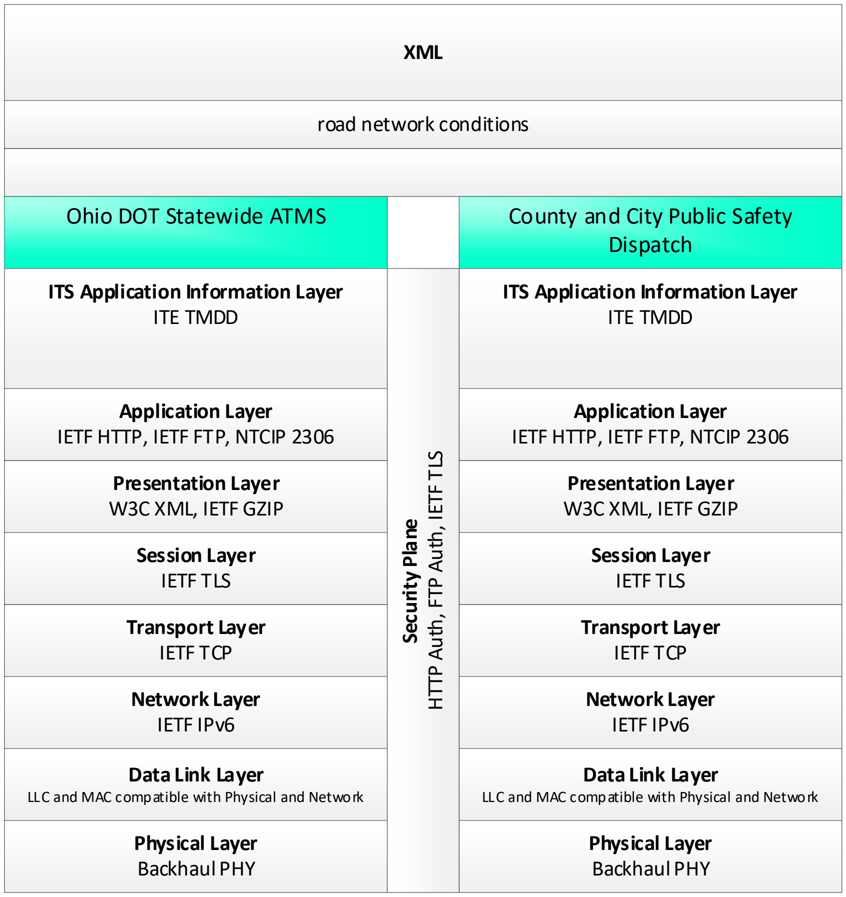
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 214 F: road network conditions / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



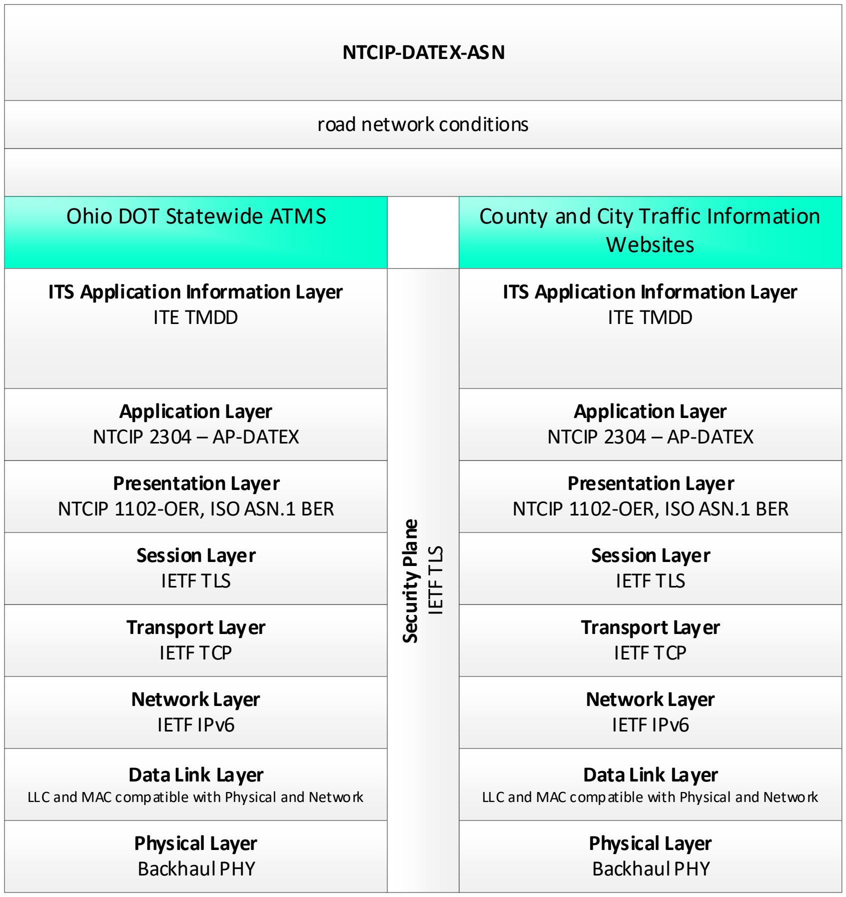
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 215 F: road network conditions / S: Ohio DOT Statewide ATMS -> D: County and City Emergency Operations Centers (EOCs) / P: XML



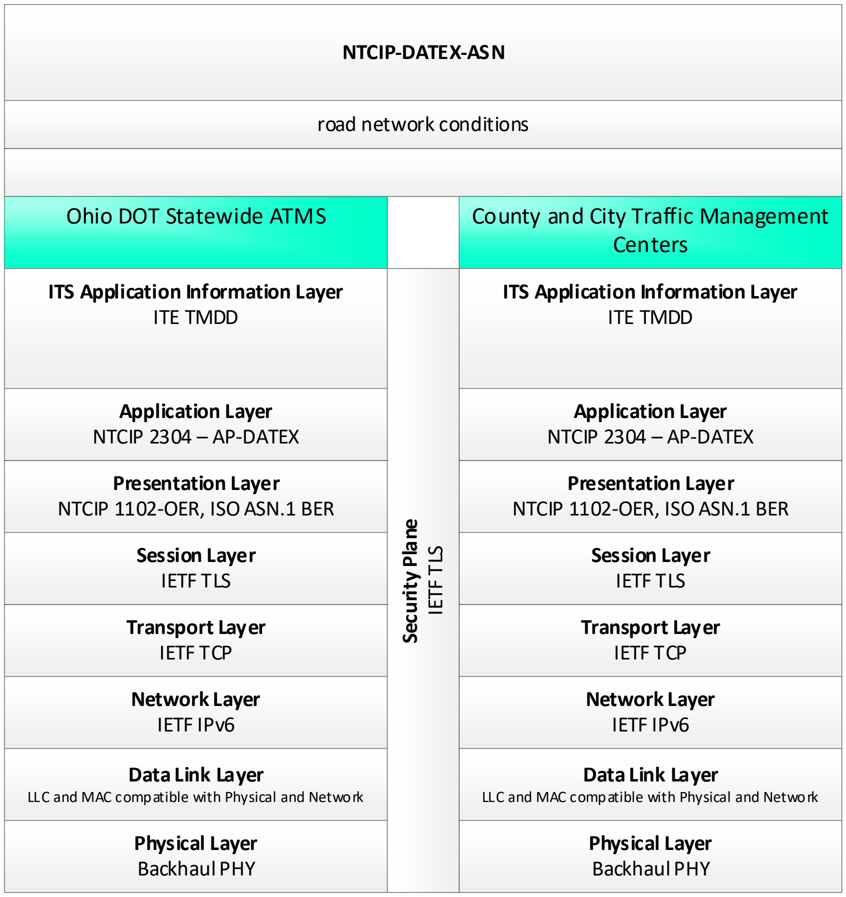
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 216 F: road network conditions / S: Ohio DOT Statewide ATMS -> D: County and City Public Safety Dispatch / P: XML



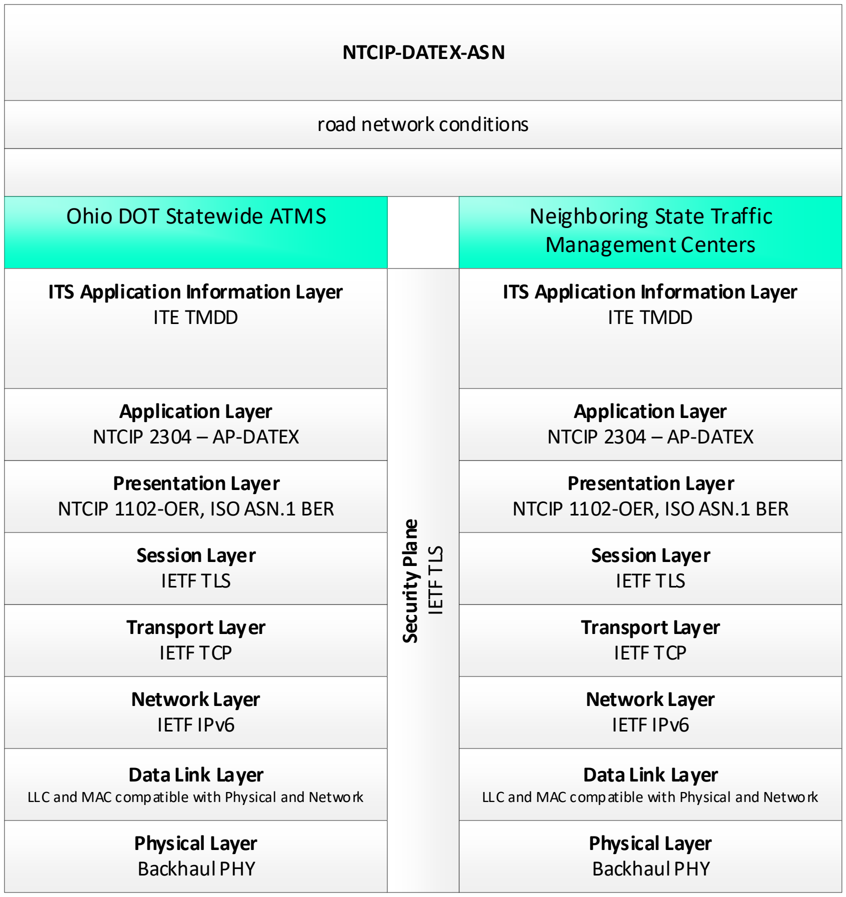
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 217 F: road network conditions / S: Ohio DOT Statewide ATMS -> D: County and City Traffic Information Websites / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 218 F: road network conditions / S: Ohio DOT Statewide ATMS -> D: County and City Traffic Management Centers / P: NTCIP-DATEX



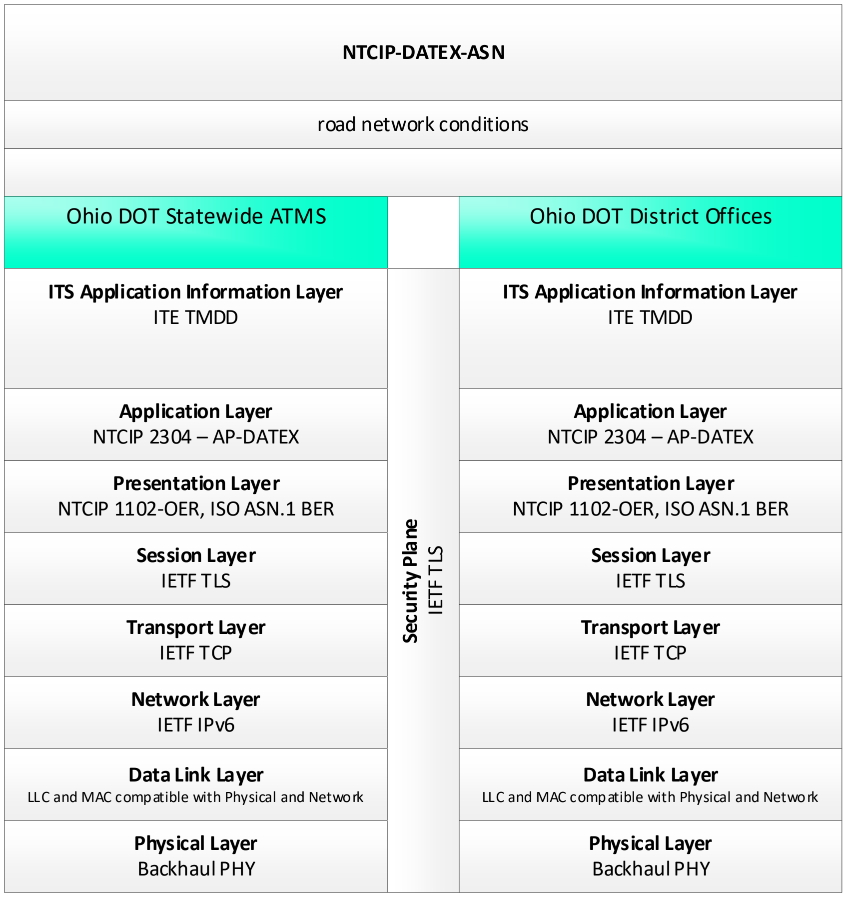
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

F: road network conditions / S: Ohio DOT Statewide ATMS -> D: Neighboring State Traffic Management Centers / P: NTCIP-DATEX

NTCIP-DATEX-ASN		
road network conditions		
Ohio DOT Statewide ATMS		Ohio DOT 511 Telephone Information Service
ITS Application Information Layer ITE TMDD	**Security Plane** IETF TLS	**ITS Application Information Layer** ITE TMDD
Application Layer NTCIP 2304 – AP-DATEX		**Application Layer** NTCIP 2304 – AP-DATEX
Presentation Layer NTCIP 1102-OER, ISO ASN.1 BER		**Presentation Layer** NTCIP 1102-OER, ISO ASN.1 BER
Session Layer IETF TLS		**Session Layer** IETF TLS
Transport Layer IETF TCP		**Transport Layer** IETF TCP
Network Layer IETF IPv6		**Network Layer** IETF IPv6
Data Link Layer LLC and MAC compatible with Physical and Network		**Data Link Layer** LLC and MAC compatible with Physical and Network
Physical Layer Backhaul PHY		**Physical Layer** Backhaul PHY

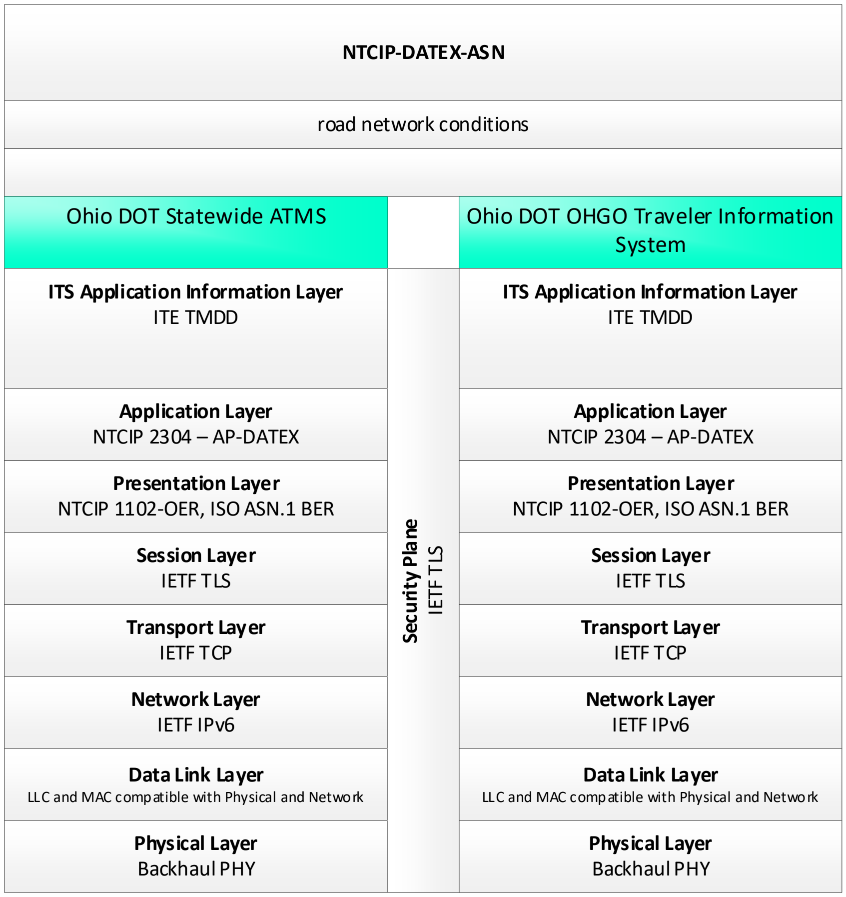
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

F: road network conditions / S: Ohio DOT Statewide ATMS -> D: Ohio DOT 511 Telephone Information Service / P: NTCIP-DATEX



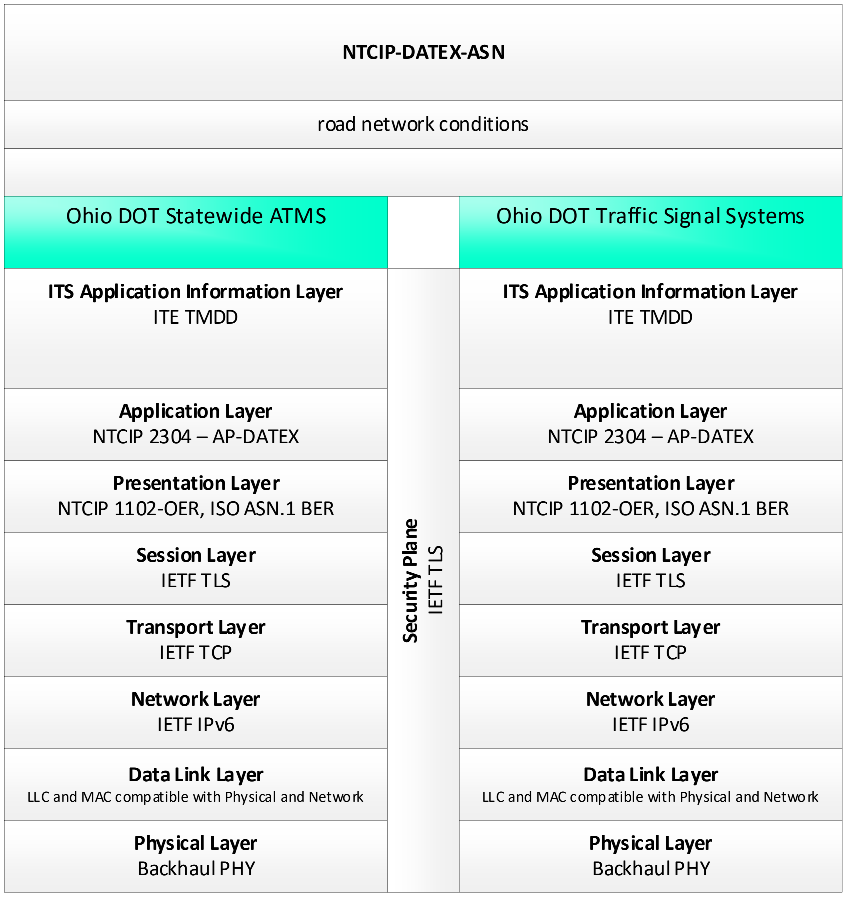
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

F: road network conditions / S: Ohio DOT Statewide ATMS -> D: Ohio DOT District Offices / P: NTCIP-DATEX



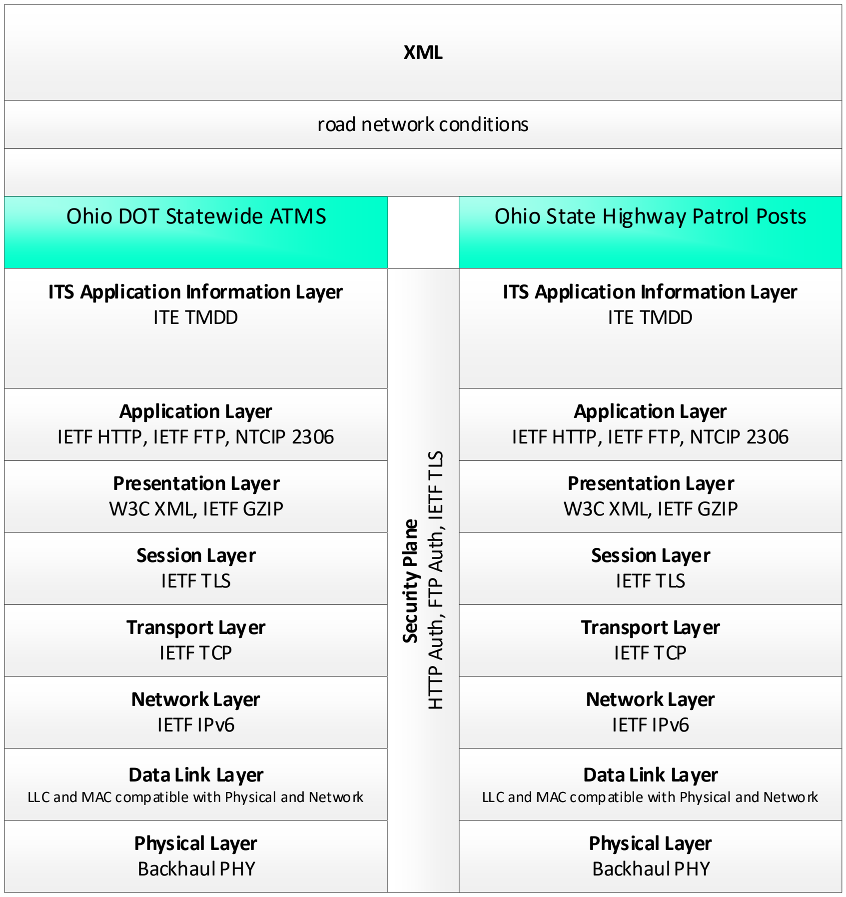
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 219 F: road network conditions / S: Ohio DOT Statewide ATMS -> D: Ohio DOT OHGO Traveler Information System / P: NTCIP-DATEX



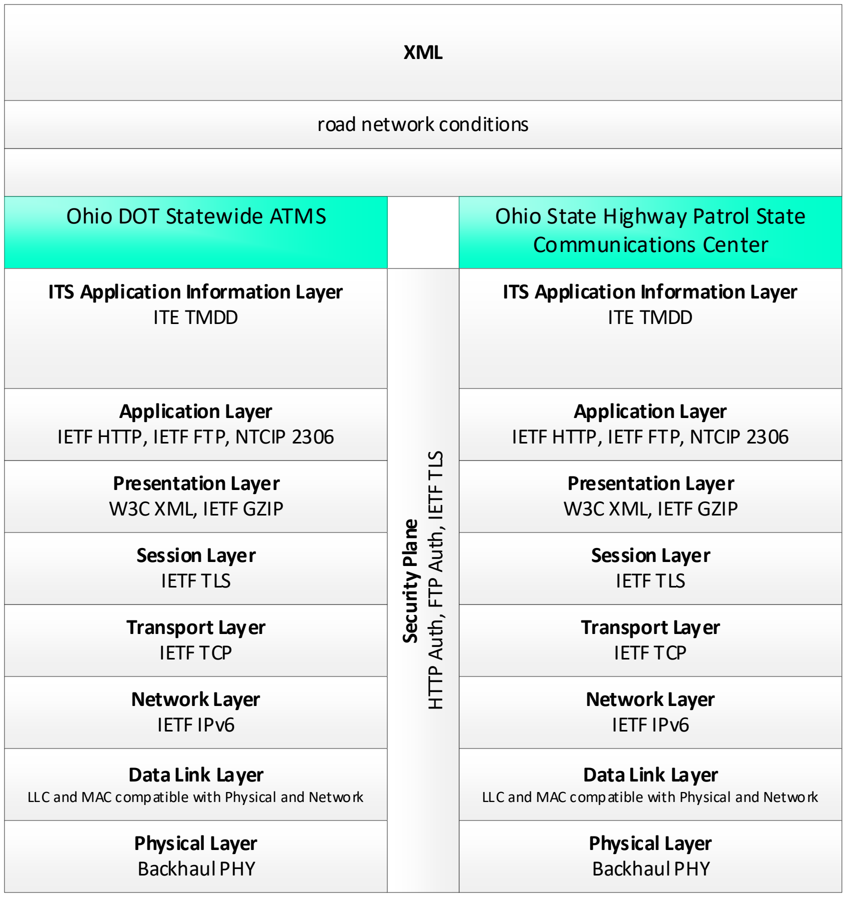
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 220 F: road network conditions / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Traffic Signal Systems / P: NTCIP-DATEX



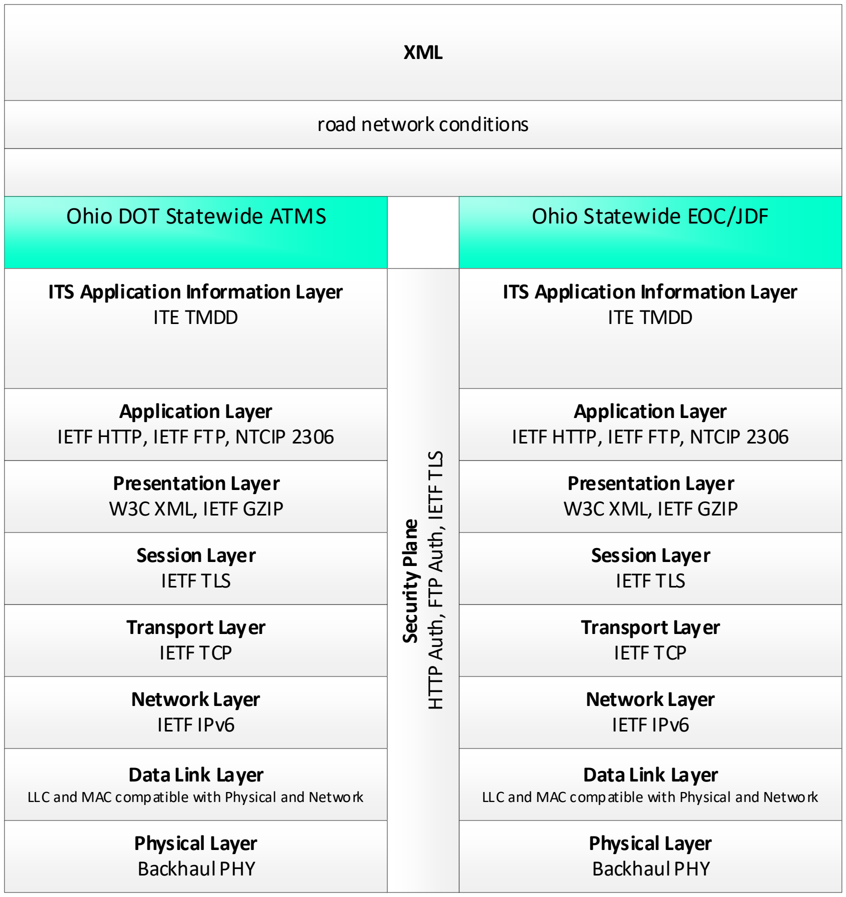
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 221 F: road network conditions / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol Posts / P: XML



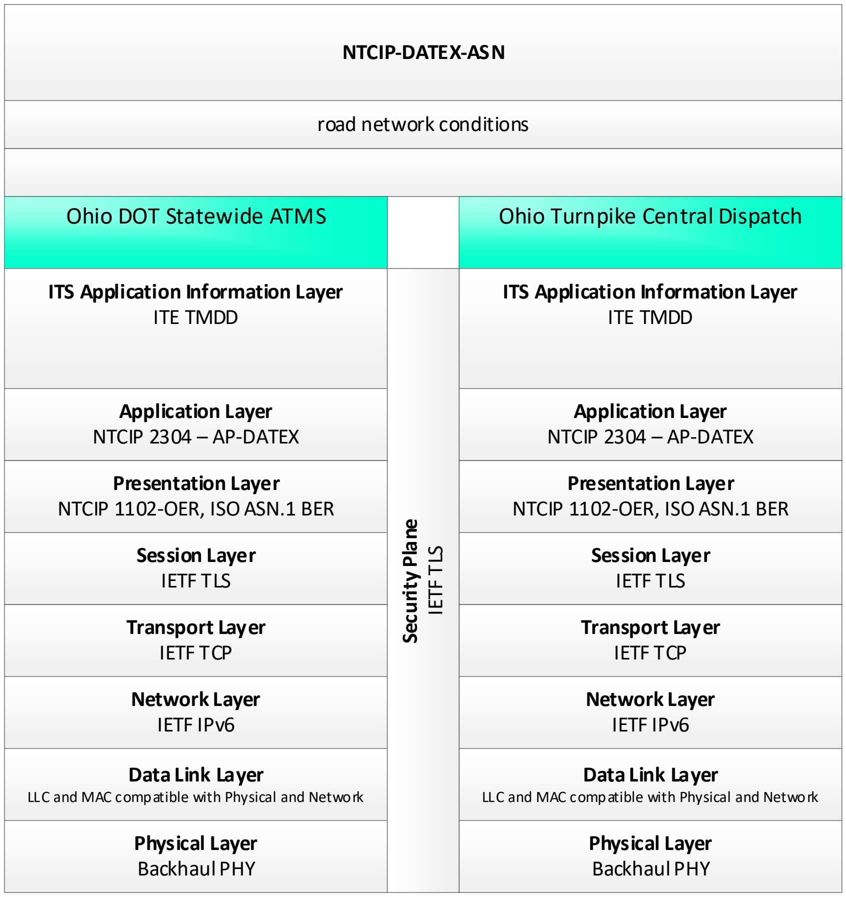
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 222 F: road network conditions / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol State Communications Center / P: XML



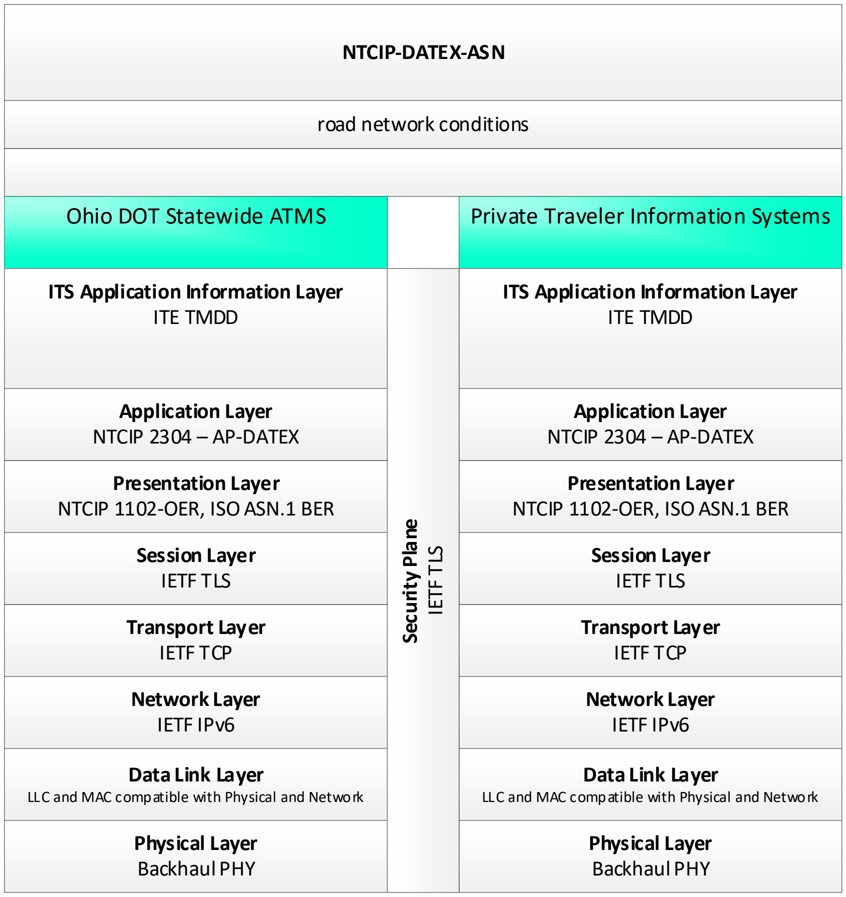
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 223 F: road network conditions / S: Ohio DOT Statewide ATMS -> D: Ohio Statewide EOC/JDF / P: XML



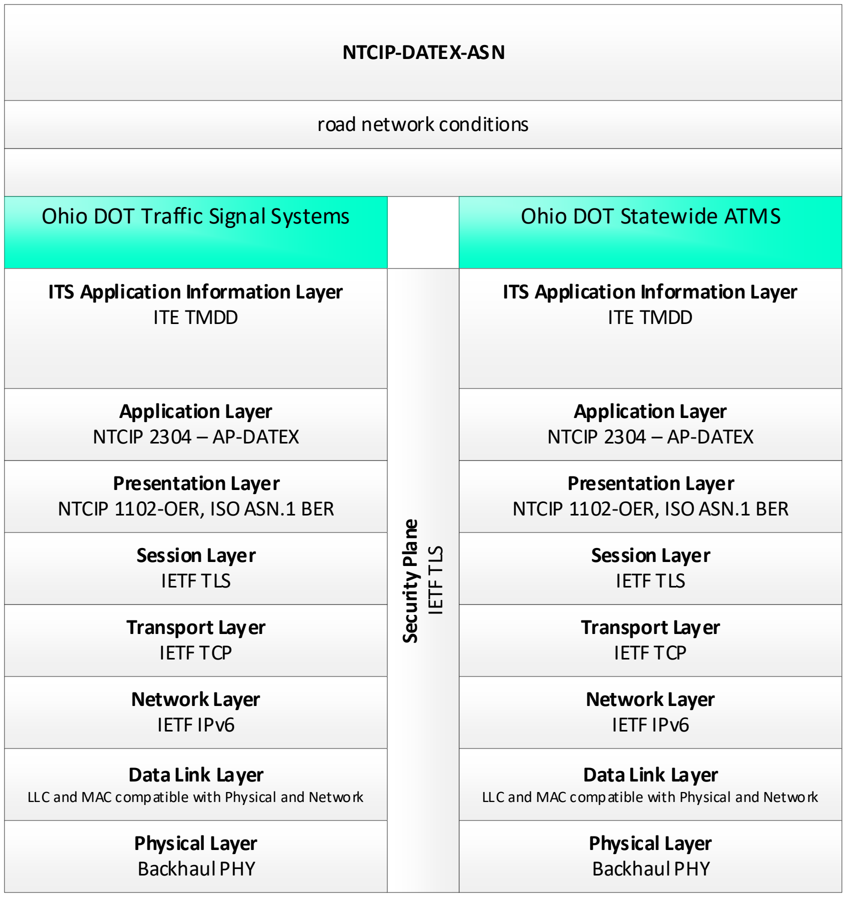
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 224 F: road network conditions / S: Ohio DOT Statewide ATMS -> D: Ohio Turnpike Central Dispatch / P: NTCIP-DATEX



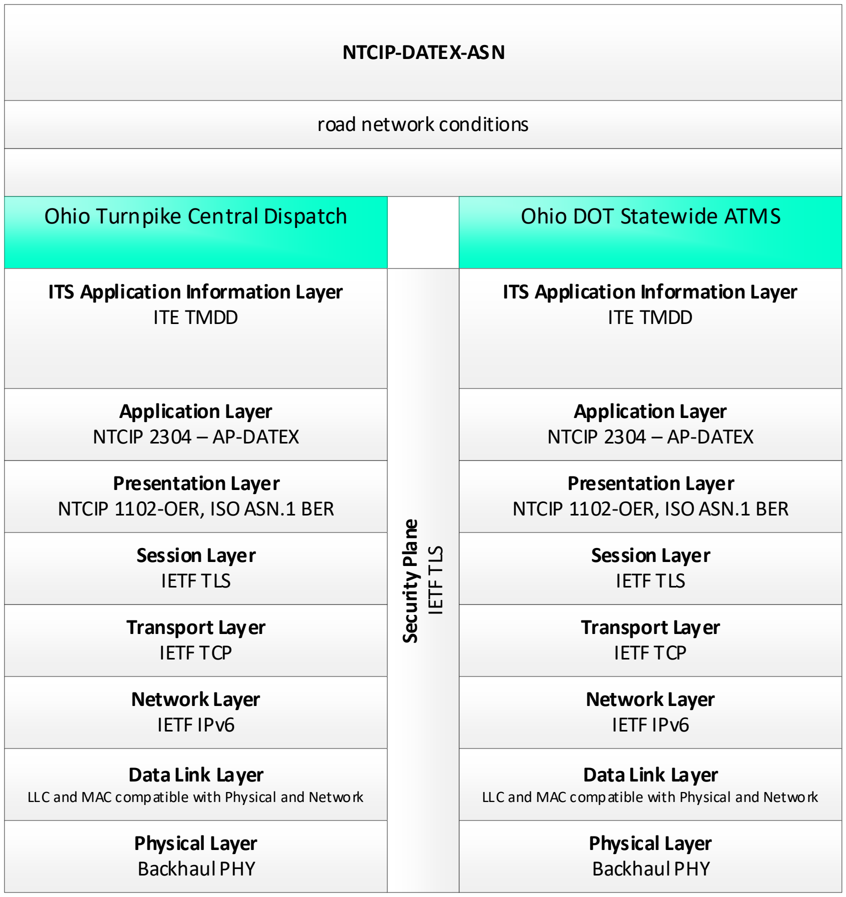
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 225 F: road network conditions / S: Ohio DOT Statewide ATMS -> D: Private Traveler Information Systems / P: NTCIP-DATEX



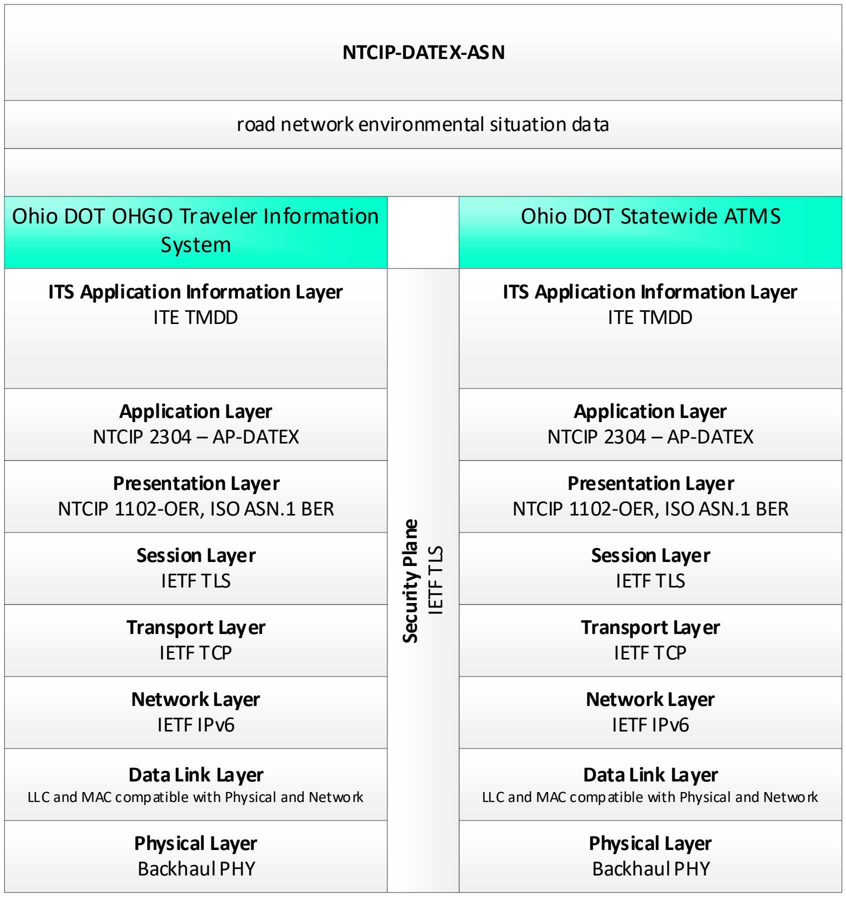
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 226 F: road network conditions / S: Ohio DOT Traffic Signal Systems -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



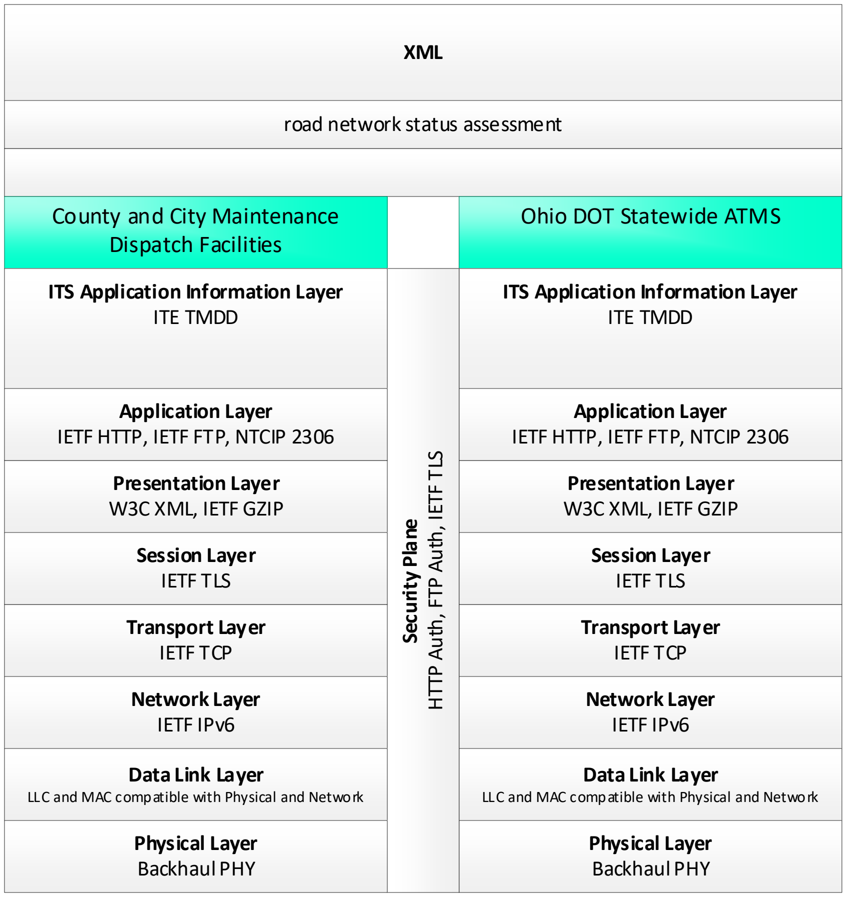
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 227 F: road network conditions / S: Ohio Turnpike Central Dispatch -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



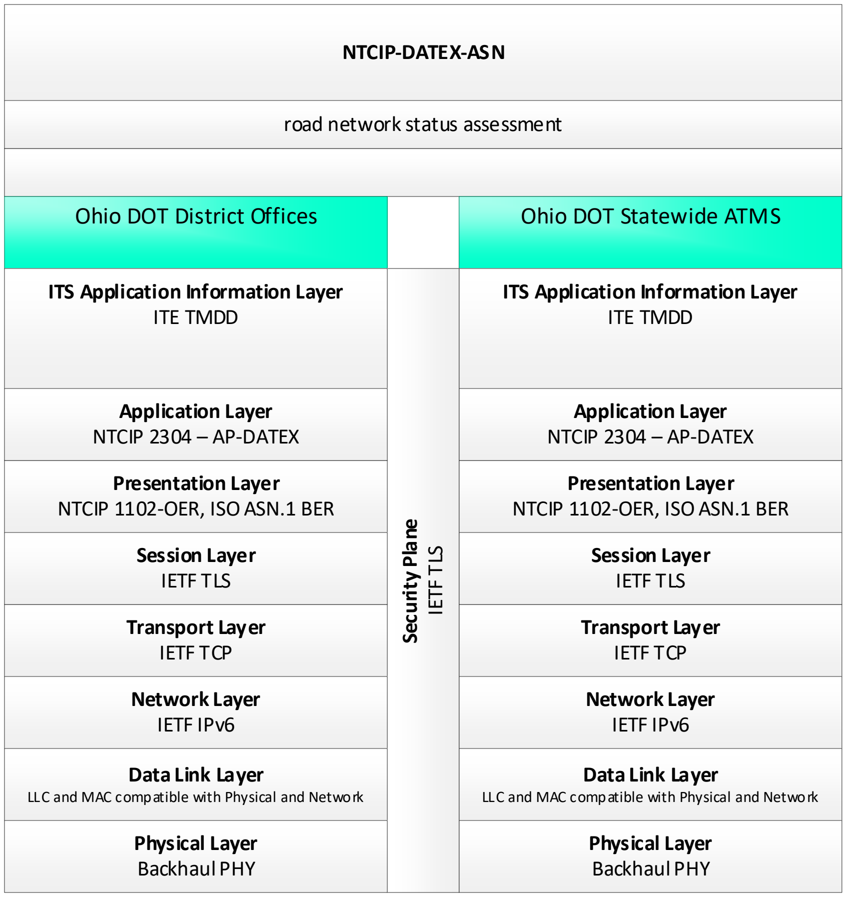
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 228 F: road network environmental situation data / S: Ohio DOT OHGO Traveler Information System -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



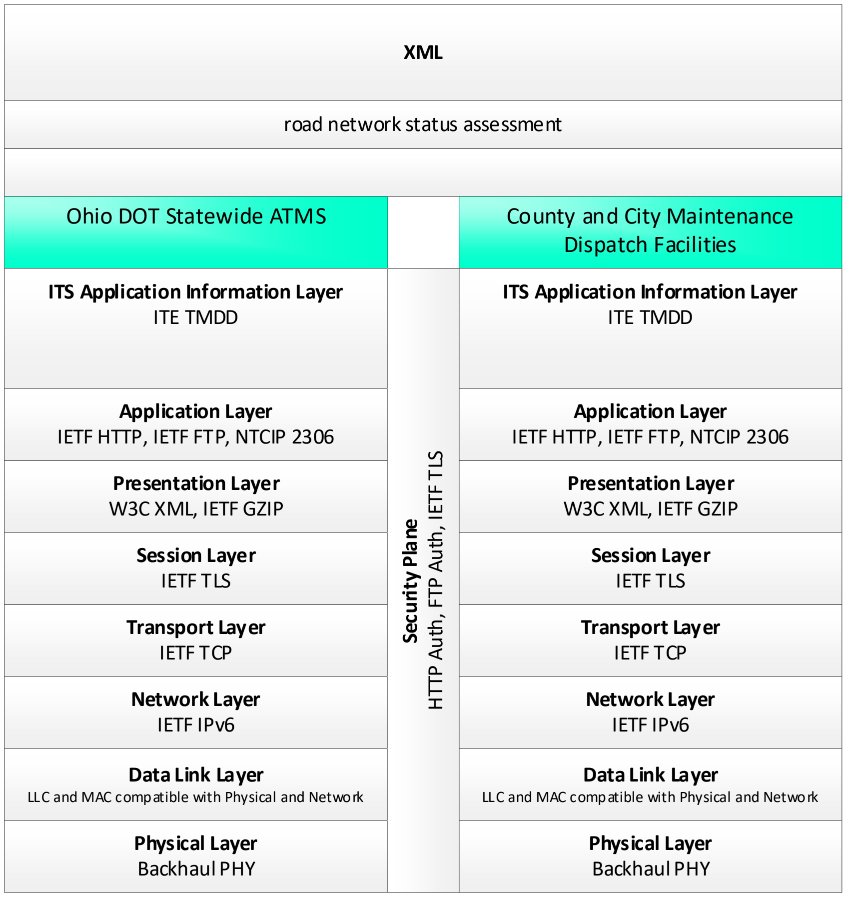
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 229 F: road network status assessment / S: County and City Maintenance Dispatch Facilities -> D: Ohio DOT Statewide ATMS / P: XML



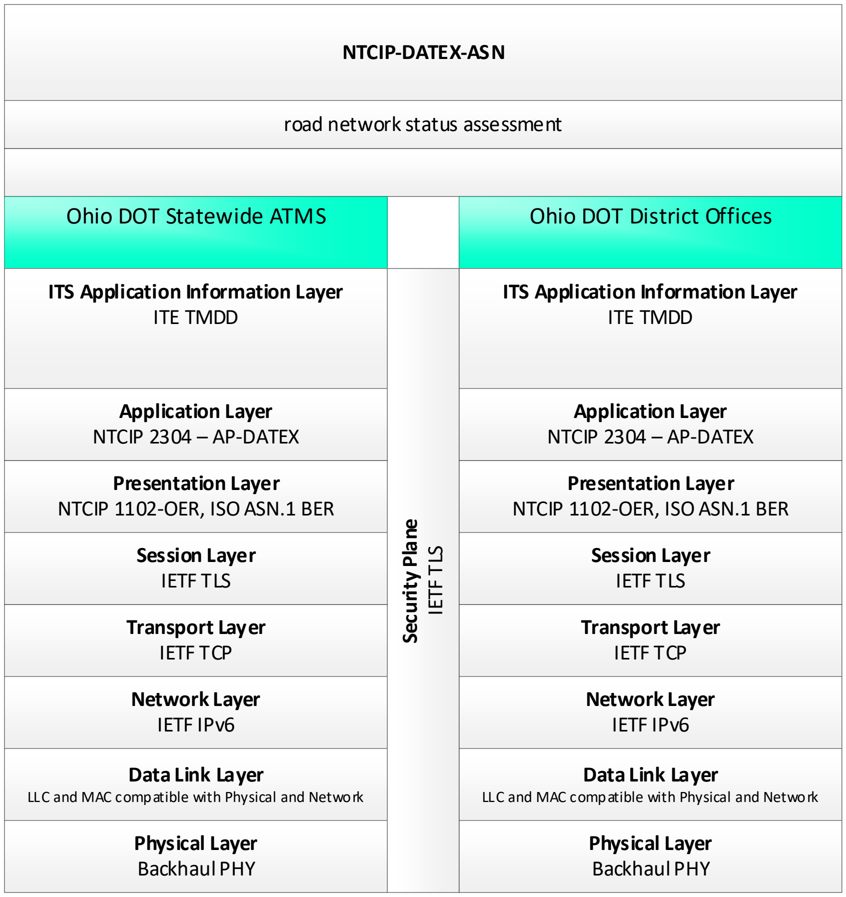
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 230 F: road network status assessment / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



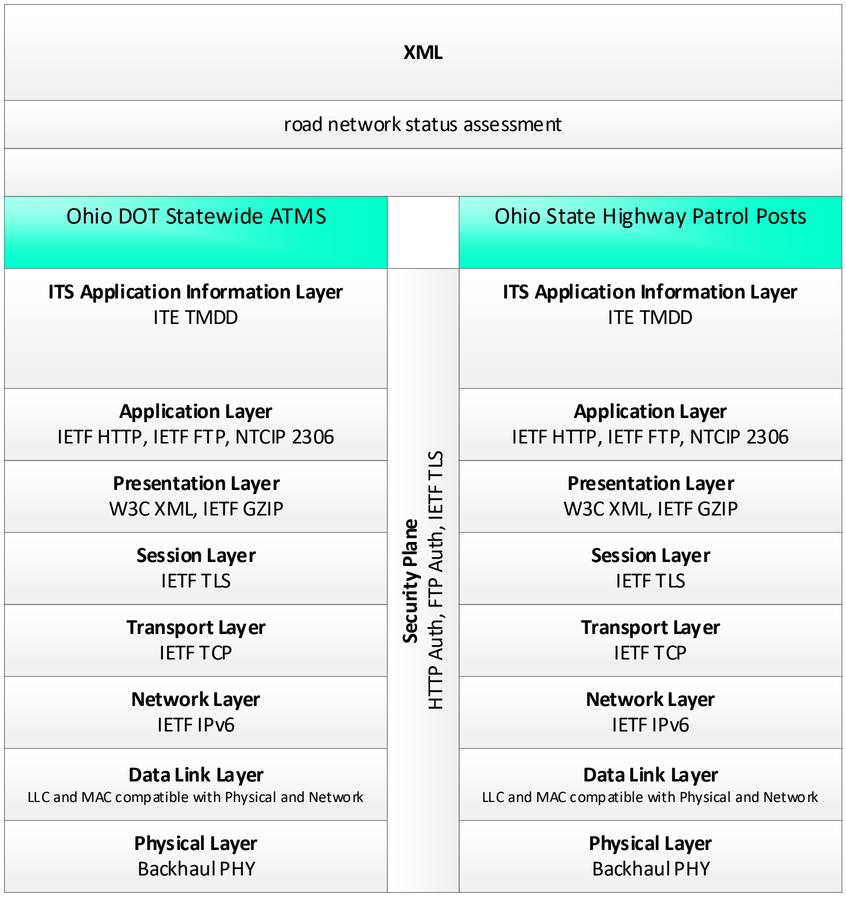
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 231 F: road network status assessment / S: Ohio DOT Statewide ATMS -> D: County and City Maintenance Dispatch Facilities / P: XML



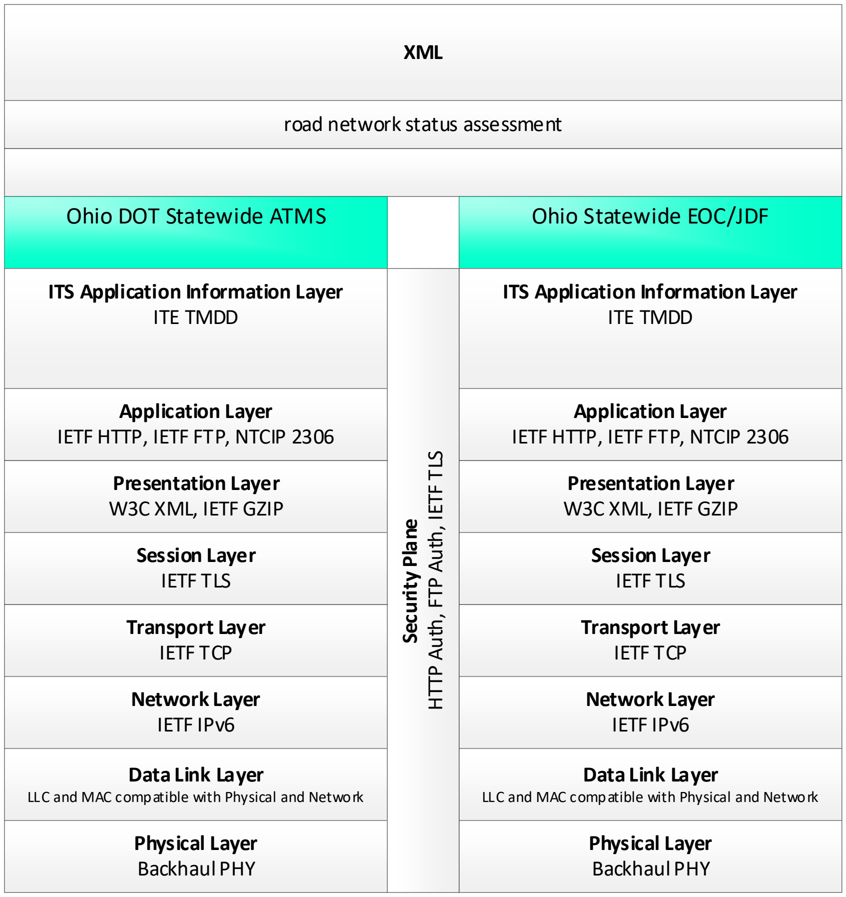
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 232 F: road network status assessment / S: Ohio DOT Statewide ATMS -> D: Ohio DOT District Offices / P: NTCIP-DATEX



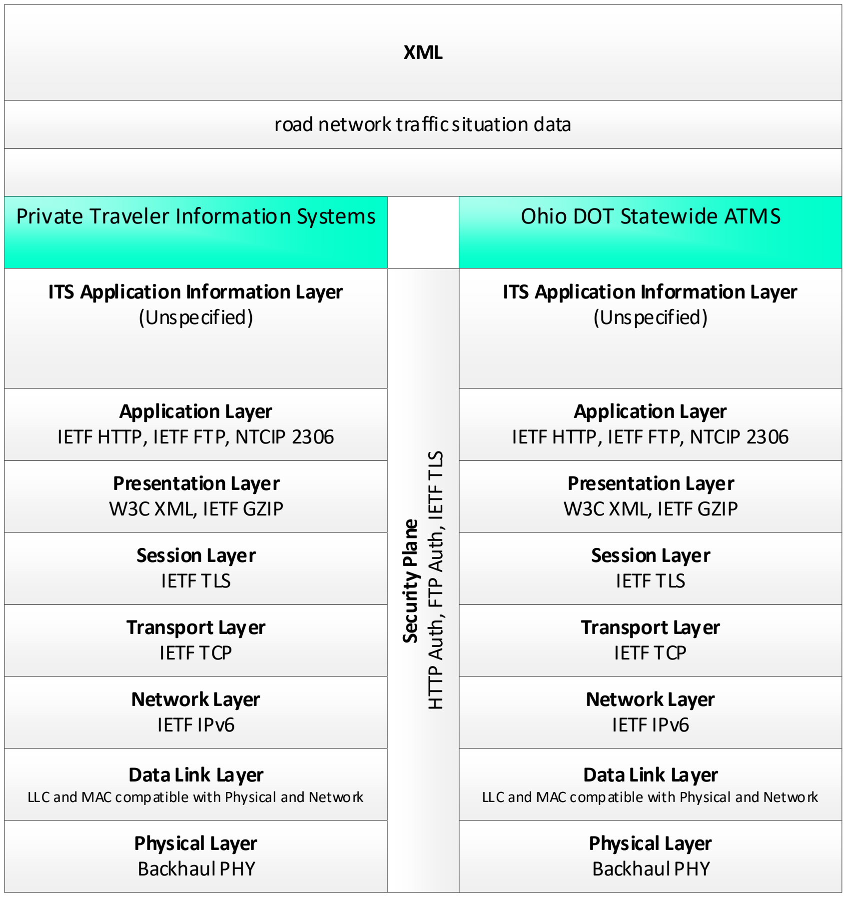
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 233 F: road network status assessment / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol Posts / P: XML



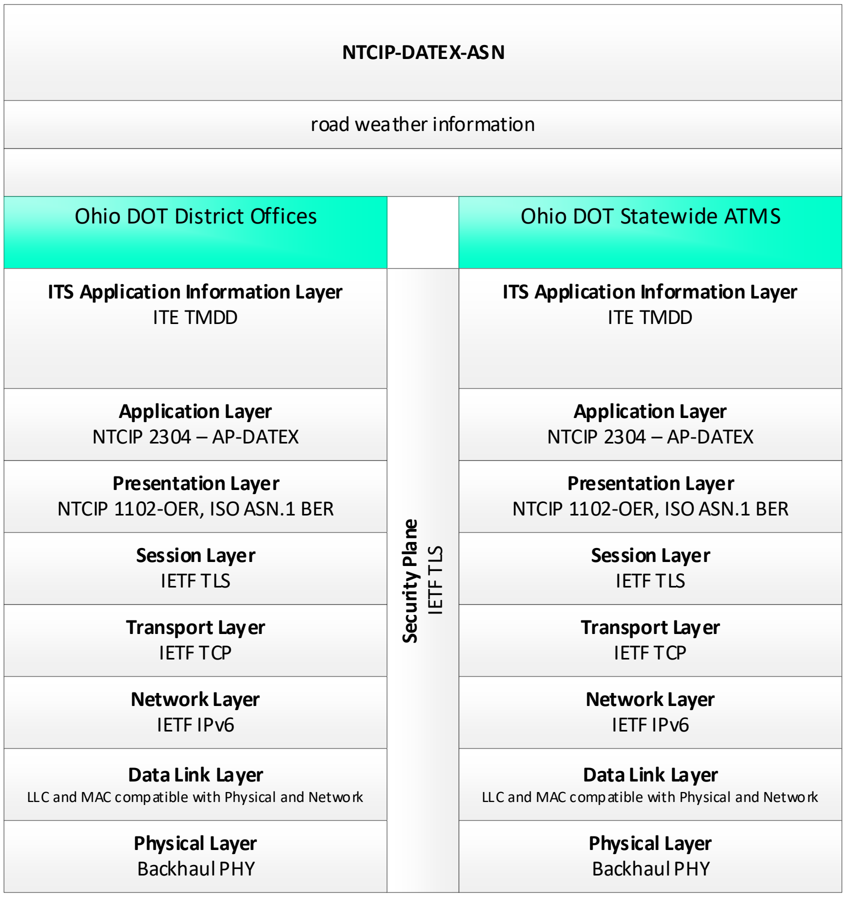
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 234 F: road network status assessment / S: Ohio DOT Statewide ATMS -> D: Ohio Statewide EOC/JDF / P: XML



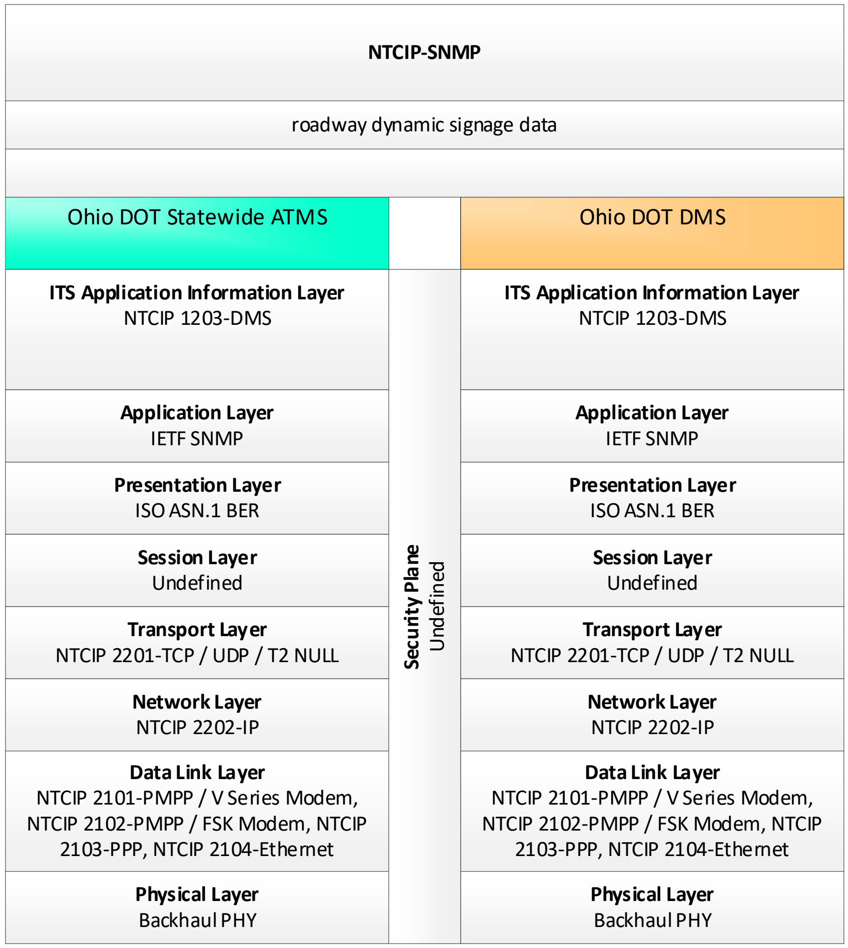
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 235 F: road network traffic situation data / S: Private Traveler Information Systems -> D: Ohio DOT Statewide ATMS / P: XML



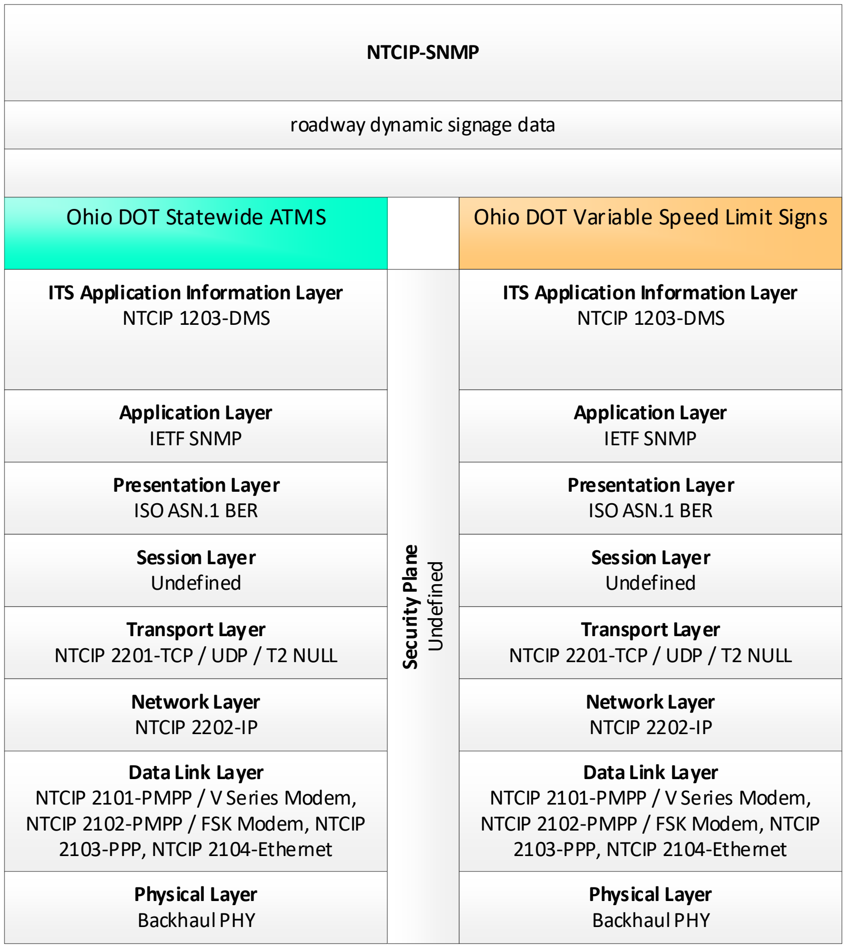
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 236 F: road weather information / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



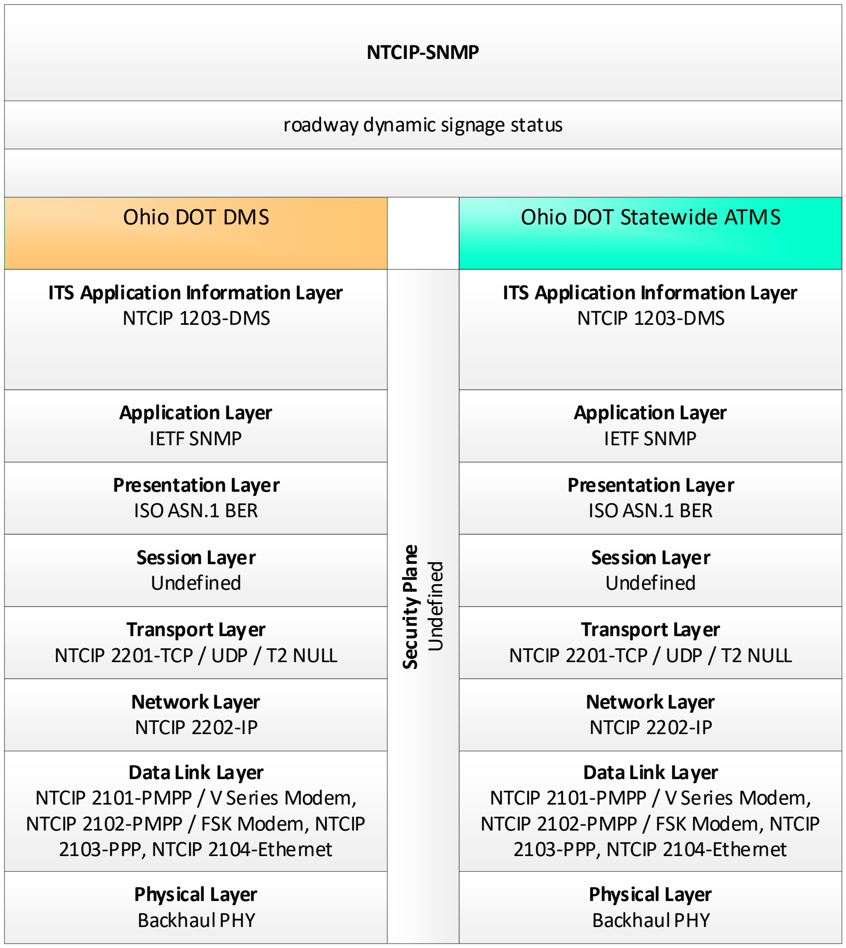
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 237 F: roadway dynamic signage data / S: Ohio DOT Statewide ATMS -> D: Ohio DOT DMS / P: NTCIP-SNMP



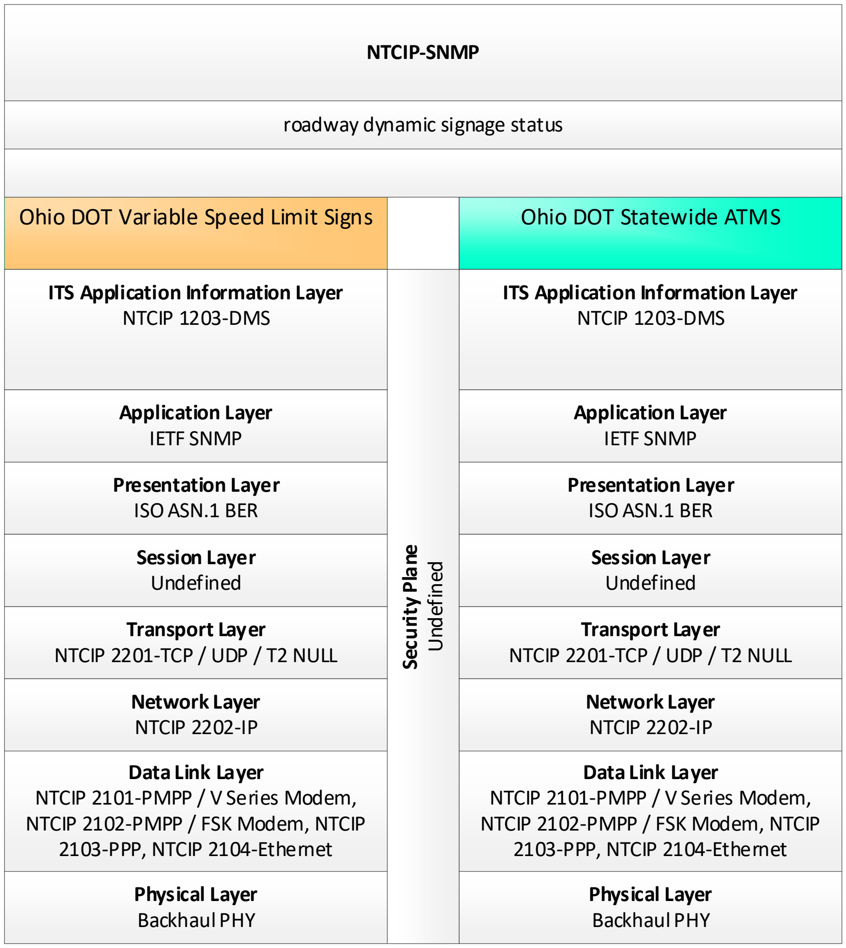
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 238 F: roadway dynamic signage data / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Variable Speed Limit Signs / P: NTCIP-SNMP



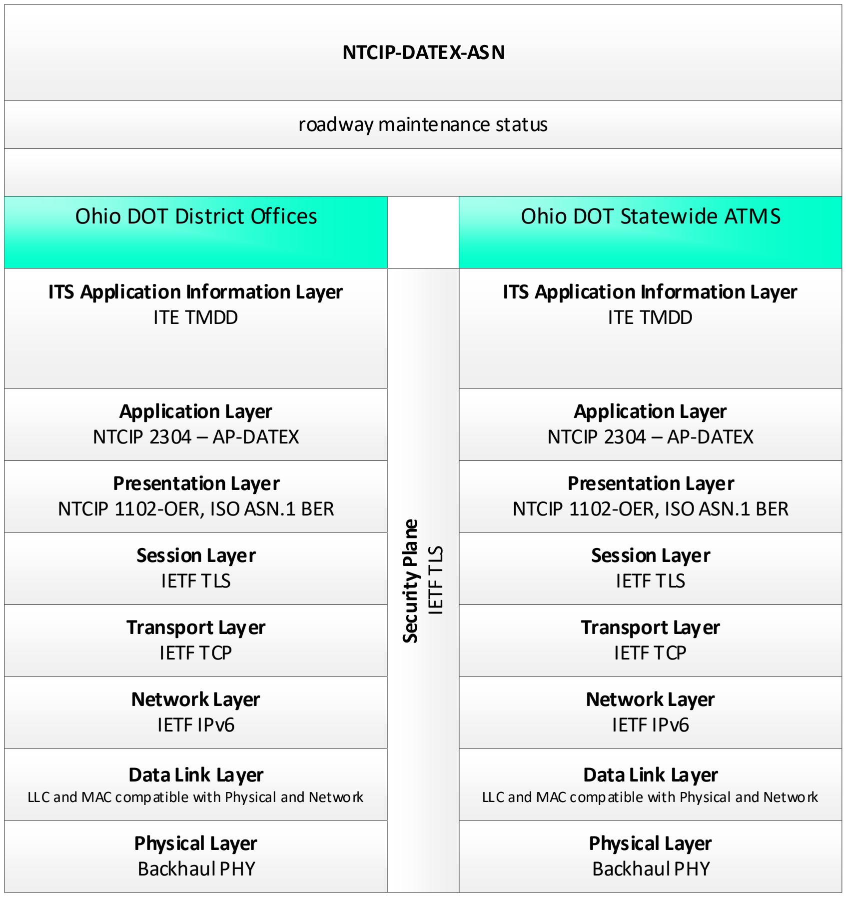
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 239 F: roadway dynamic signage status / S: Ohio DOT DMS -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP



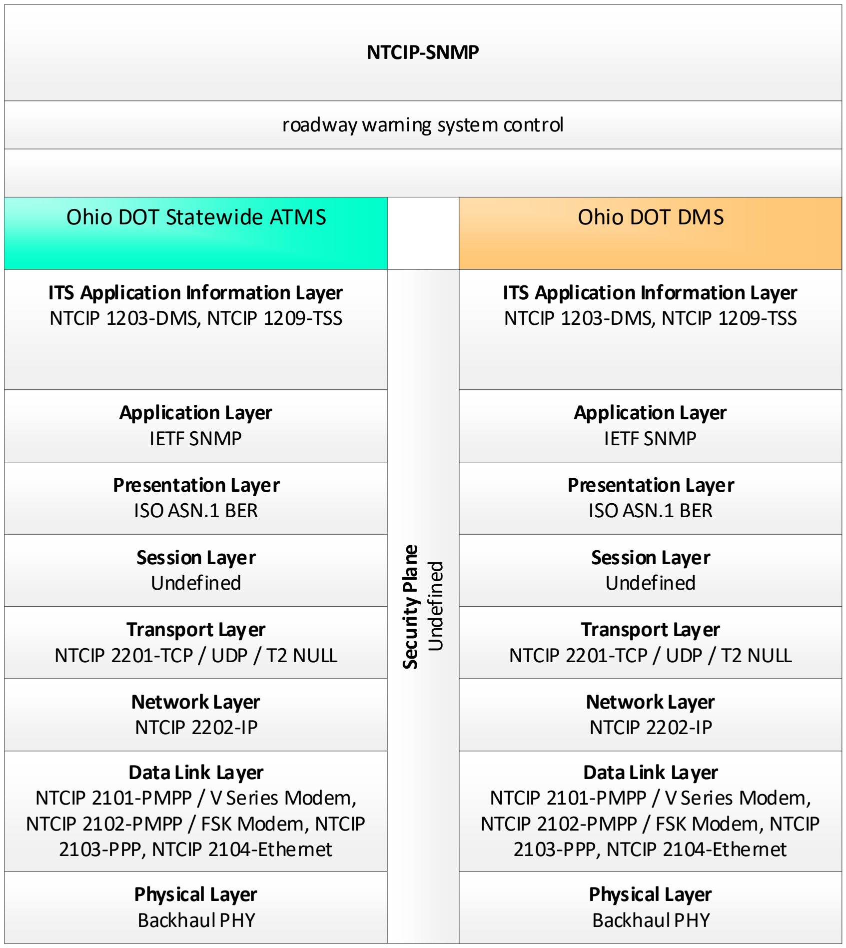
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 240 F: roadway dynamic signage status / S: Ohio DOT Variable Speed Limit Signs -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP



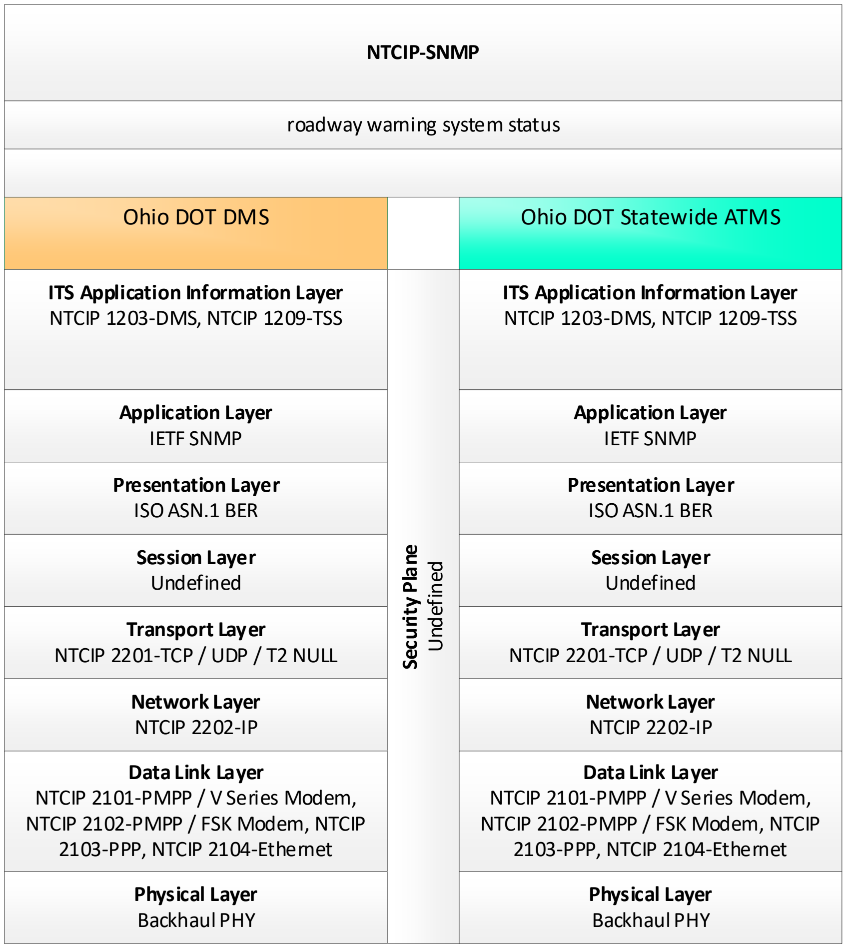
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 241 F: roadway maintenance status / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



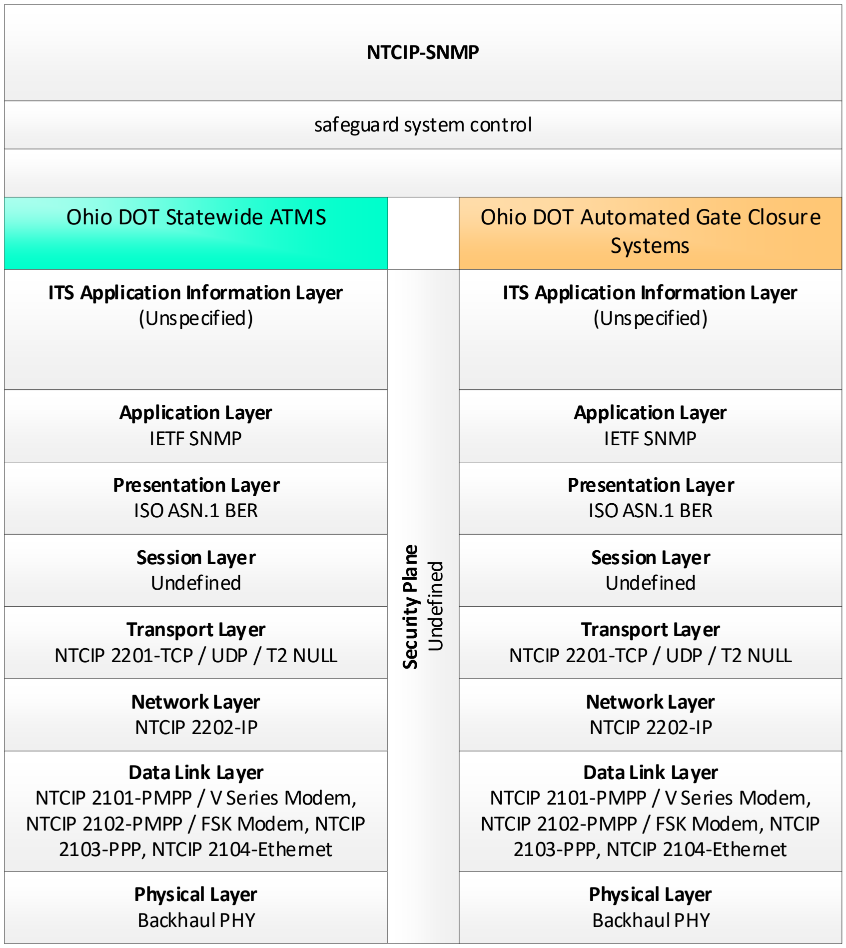
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 242 F: roadway warning system control / S: Ohio DOT Statewide ATMS -> D: Ohio DOT DMS / P: NTCIP-SNMP



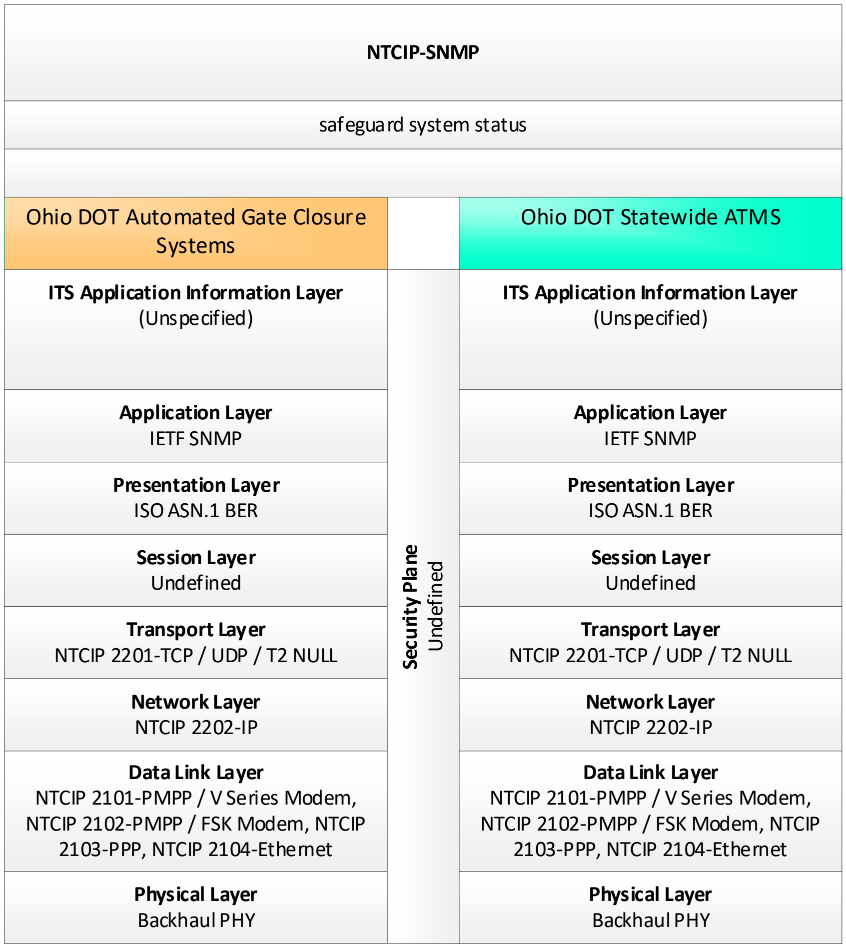
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 243 F: roadway warning system status / S: Ohio DOT DMS -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP



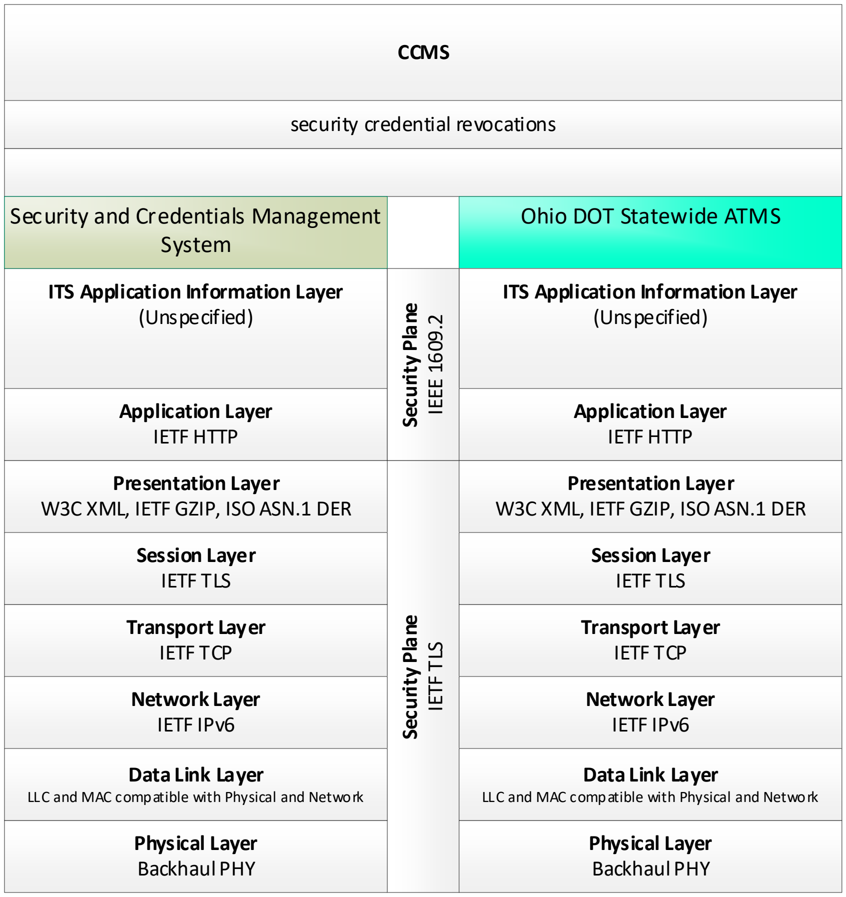
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 244 F: safeguard system control / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Automated Gate Closure Systems / P: NTCIP-SNMP



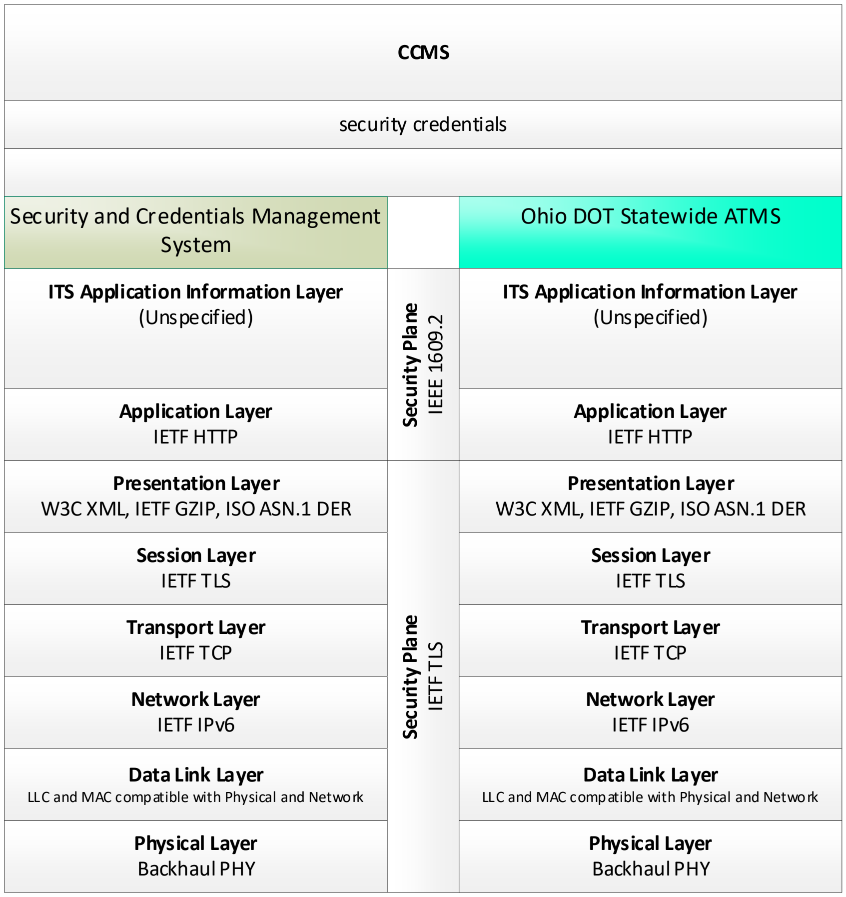
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 245 F: safeguard system status / S: Ohio DOT Automated Gate Closure Systems -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP



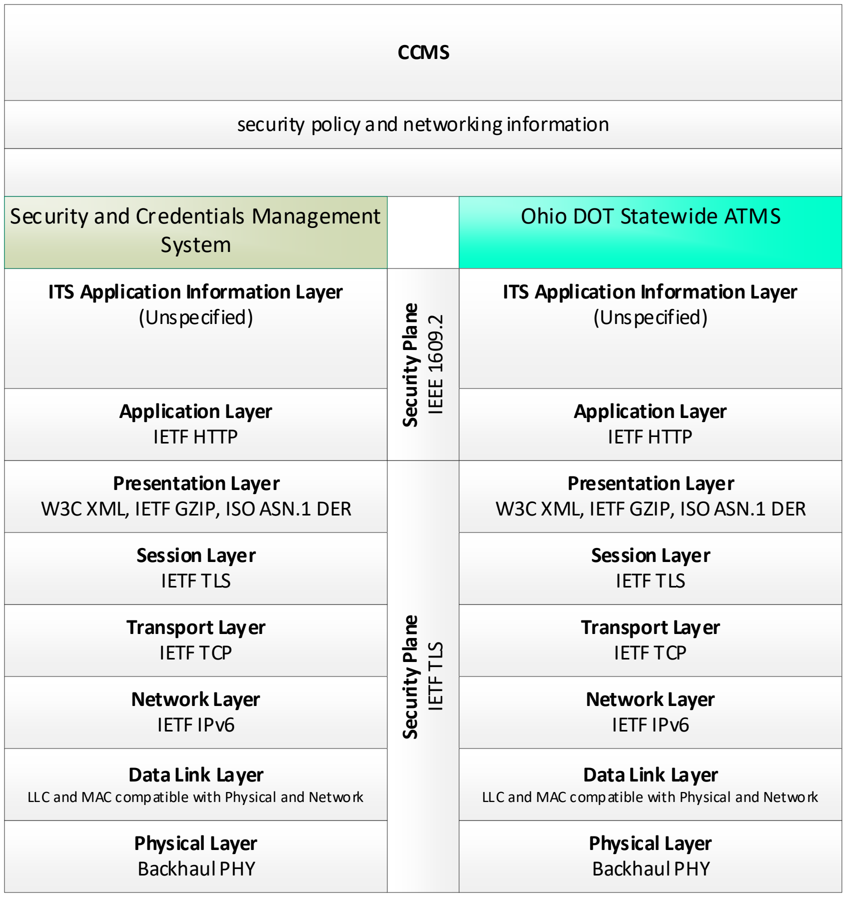
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 246 F: security credential revocations / S: Security and Credentials Management System -> D: Ohio DOT Statewide ATMS / P: CCMS



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 247 F: security credentials / S: Security and Credentials Management System -> D: Ohio DOT Statewide ATMS / P: CCMS



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 248 F: security policy and networking information / S: Security and Credentials Management System -> D: Ohio DOT Statewide ATMS / P: CCMS

RSE Gateway					
service patrol dispatch request					
Ohio DOT Statewide ATMS		Roadside Equipment			Ohio DOT Safety Patrol Vehicles
ITS Application Information Layer (Unspecified)	**Security Plane** IEEE 1609.2			**Security Plane** IEEE 1609.2	**ITS Application Information Layer** (Unspecified)
Application Layer Undefined					**Application Layer** Undefined
Presentation Layer ISO ASN.1 UPER	**Security Plane** IETF DTLS			**Security Plane** IETF DTLS	**Presentation Layer** ISO ASN.1 UPER
Session Layer IETF DTLS		**Session Layer** IETF DTLS	**Session Layer** IETF DTLS		**Session Layer** IETF DTLS
Transport Layer IETF UDP		**Transport Layer** IETF UDP	**Transport Layer** IETF UDP		**Transport Layer** IETF UDP
Network Layer IETF IPv6		**Network Layer** IETF IPv6	**Network Layer** IETF IPv6		**Network Layer** IETF IPv6
Data Link Layer LLC and MAC compatible with Physical and Network		**Data Link Layer** LLC and MAC compatible with Physical and Network	**Data Link Layer** IEEE 1609.4, IEEE 802.11		**Data Link Layer** IEEE 1609.4, IEEE 802.11
Physical Layer Backhaul PHY		**Physical Layer** Backhaul PHY	**Physical Layer** IEEE 802.11		**Physical Layer** IEEE 802.11

* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 249 F: service patrol dispatch request / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Safety Patrol Vehicles / P: RSEGateway-VehicleSource

ASN.1/Wide Area Wireless		
service patrol dispatch request		
Ohio DOT Statewide ATMS		Ohio DOT Safety Patrol Vehicles
ITS Application Information Layer (Unspecified)	**Security Plane** IEEE 1609.2	**ITS Application Information Layer** (Unspecified)
Application Layer Undefined		**Application Layer** Undefined
Presentation Layer ISO ASN.1 UPER	**Security Plane** IETF TLS	**Presentation Layer** ISO ASN.1 UPER
Session Layer IETF TLS		**Session Layer** IETF TLS
Transport Layer IETF TCP		**Transport Layer** IETF TCP
Network Layer IETF IPv6		**Network Layer** IETF IPv6
Data Link Layer Wide Area Wireless WAN		**Data Link Layer** Wide Area Wireless WAN
Physical Layer Wide Area Wireless WAN		**Physical Layer** Wide Area Wireless WAN

* IEEE 1609.2 is an available standard to consider depending on physical device in the vehicle.

Figure 250 F: service patrol dispatch request / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Safety Patrol Vehicles / P: WAW-ASN1

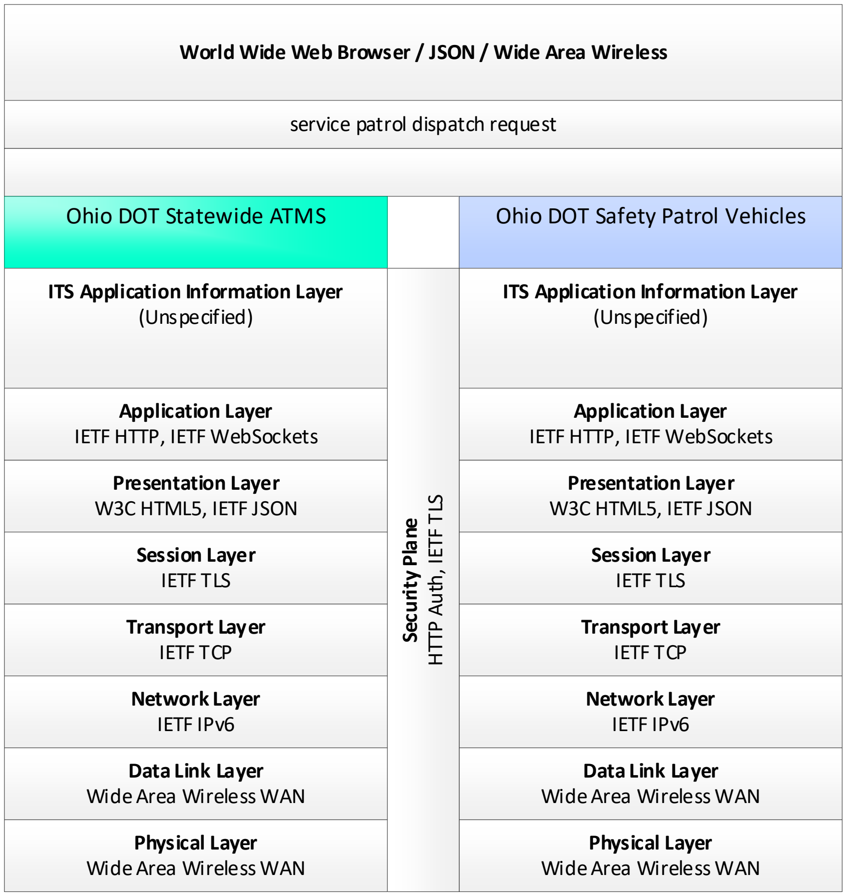


Figure 251 F: service patrol dispatch request / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Safety Patrol Vehicles / P: WAW-WWWBrowser-JSON

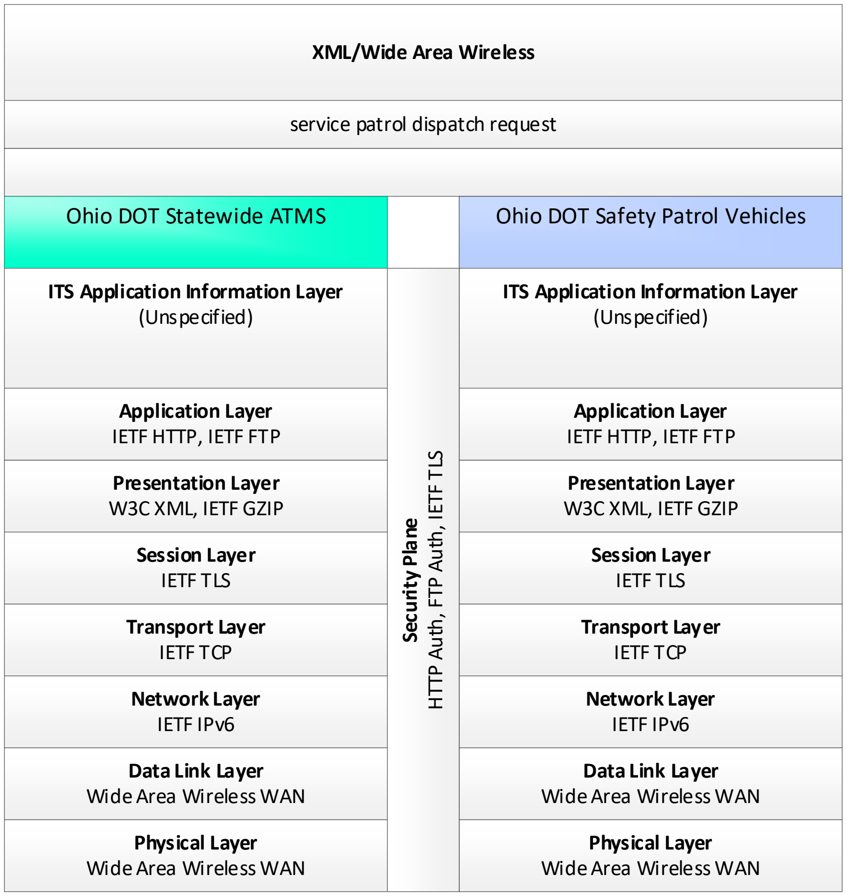
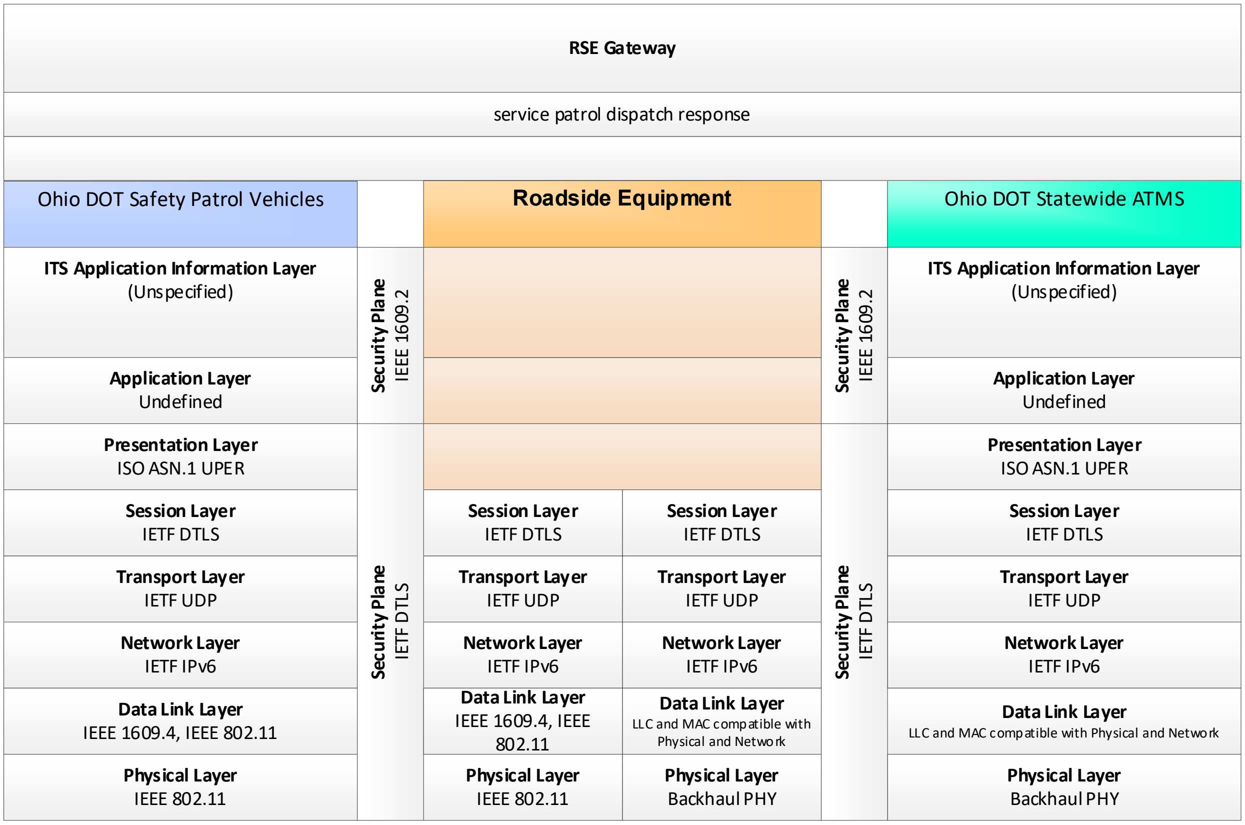
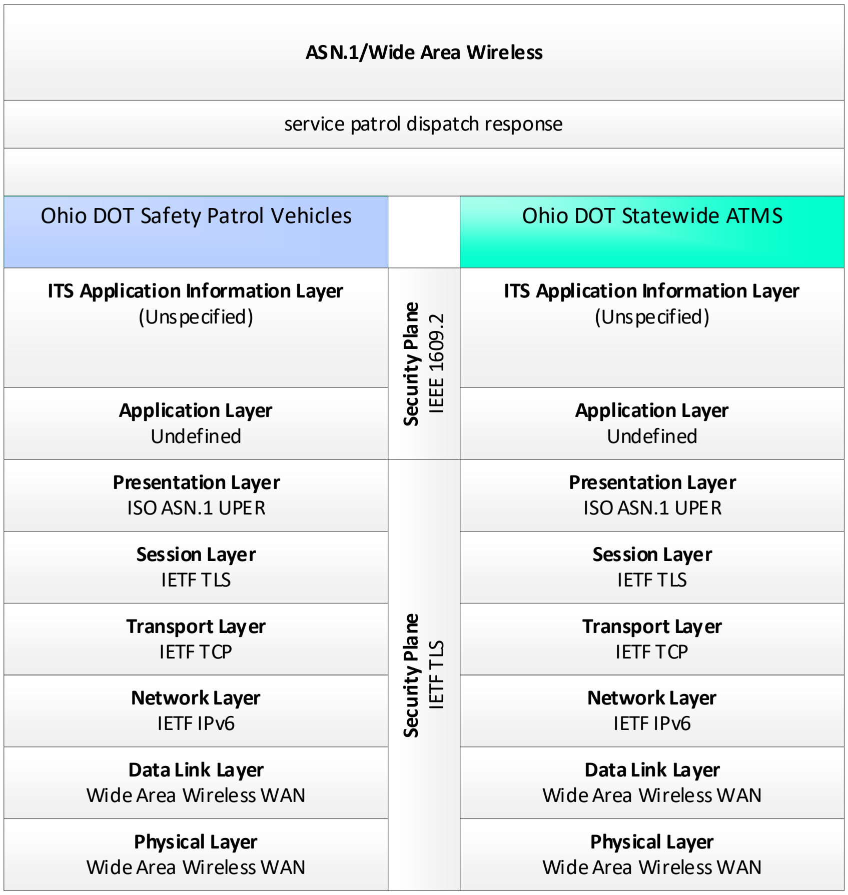


Figure 252 F: service patrol dispatch request / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Safety Patrol Vehicles / P: WAW-XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 253 F: service patrol dispatch response / S: Ohio DOT Safety Patrol Vehicles -> D: Ohio DOT Statewide ATMS / P: RSEGateway-VehicleSource



* IEEE 1609.2 is an available standard to consider depending on physical device in the vehicle.

Figure 254 F: service patrol dispatch response / S: Ohio DOT Safety Patrol Vehicles -> D: Ohio DOT Statewide ATMS / P: WAW-ASN1

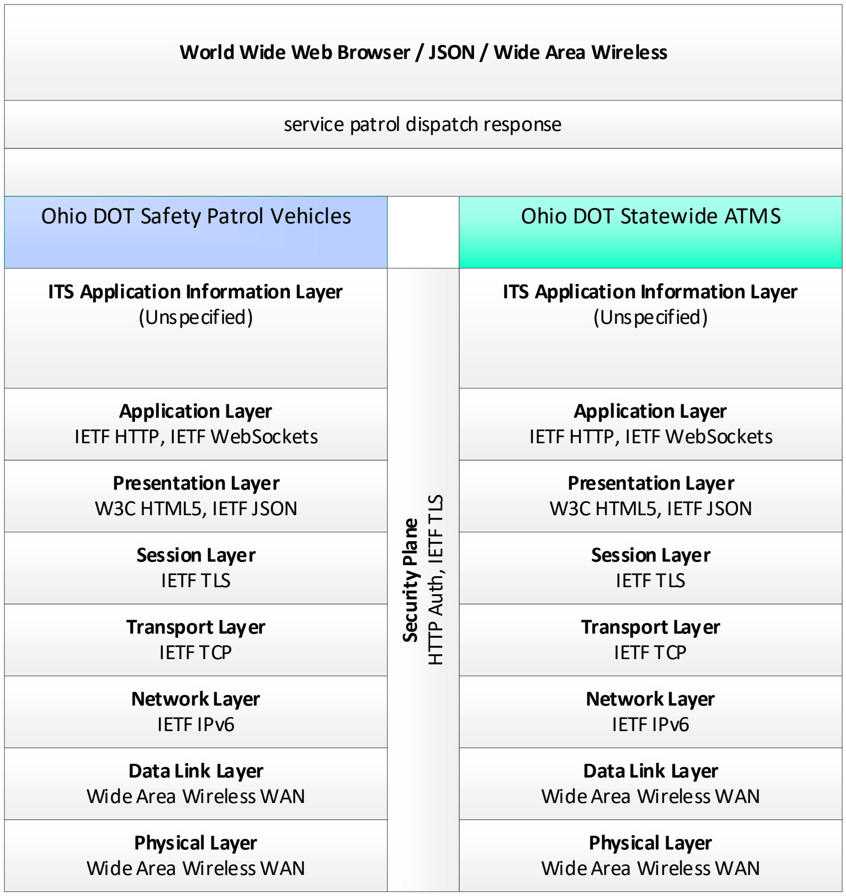


Figure 255 F: service patrol dispatch response / S: Ohio DOT Safety Patrol Vehicles -> D: Ohio DOT Statewide ATMS / P: WAW-WWWBrowser-JSON

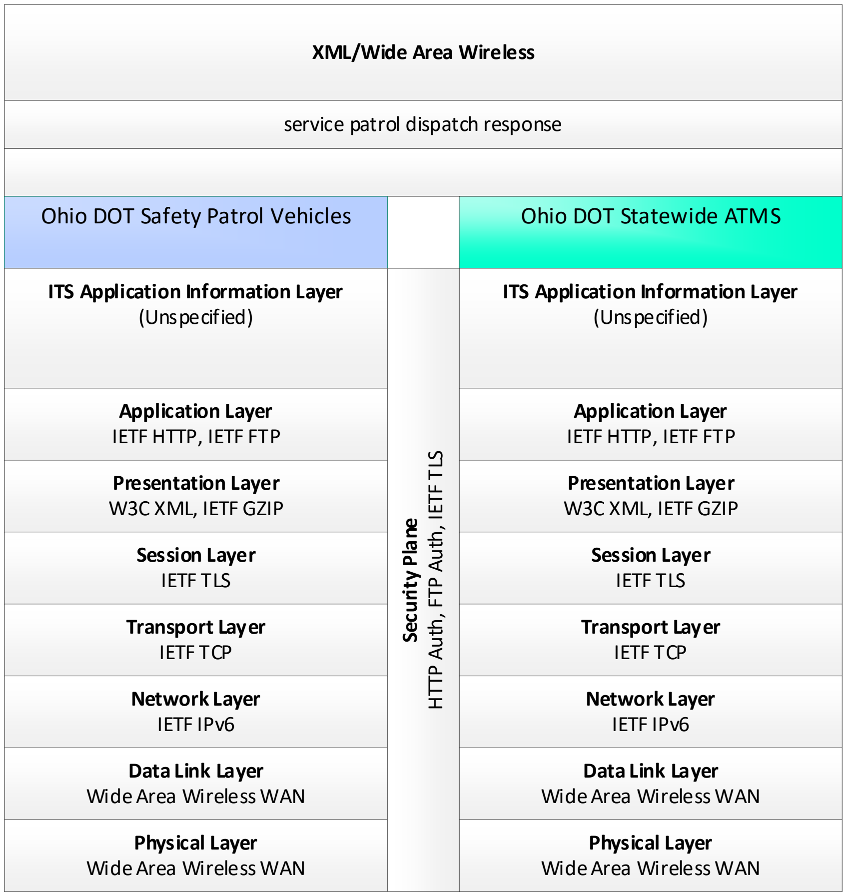


Figure 256 F: service patrol dispatch response / S: Ohio DOT Safety Patrol Vehicles -> D: Ohio DOT Statewide ATMS / P: WAW-XML

RSE Gateway					
service patrol incident status					
Ohio DOT Safety Patrol Vehicles		**Roadside Equipment**			Ohio DOT Statewide ATMS
ITS Application Information Layer (Unspecified)	**Security Plane** IEEE 1609.2			**Security Plane** IEEE 1609.2	**ITS Application Information Layer** (Unspecified)
Application Layer Undefined					**Application Layer** Undefined
Presentation Layer ISO ASN.1 UPER	**Security Plane** IETF DTLS			**Security Plane** IETF DTLS	**Presentation Layer** ISO ASN.1 UPER
Session Layer IETF DTLS		**Session Layer** IETF DTLS	**Session Layer** IETF DTLS		**Session Layer** IETF DTLS
Transport Layer IETF UDP		**Transport Layer** IETF UDP	**Transport Layer** IETF UDP		**Transport Layer** IETF UDP
Network Layer IETF IPv6		**Network Layer** IETF IPv6	**Network Layer** IETF IPv6		**Network Layer** IETF IPv6
Data Link Layer IEEE 1609.4, IEEE 802.11		**Data Link Layer** IEEE 1609.4, IEEE 802.11	**Data Link Layer** LLC and MAC compatible with Physical and Network		**Data Link Layer** LLC and MAC compatible with Physical and Network
Physical Layer IEEE 802.11		**Physical Layer** IEEE 802.11	**Physical Layer** Backhaul PHY		**Physical Layer** Backhaul PHY

* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 257 F: service patrol incident status / S: Ohio DOT Safety Patrol Vehicles -> D: Ohio DOT Statewide ATMS / P: RSEGateway-VehicleSource

ASN.1/Wide Area Wireless		
service patrol incident status		
Ohio DOT Safety Patrol Vehicles		Ohio DOT Statewide ATMS
ITS Application Information Layer (Unspecified)	**Security Plane** IEEE 1609.2	**ITS Application Information Layer** (Unspecified)
Application Layer Undefined		**Application Layer** Undefined
Presentation Layer ISO ASN.1 UPER	**Security Plane** IETF TLS	**Presentation Layer** ISO ASN.1 UPER
Session Layer IETF TLS		**Session Layer** IETF TLS
Transport Layer IETF TCP		**Transport Layer** IETF TCP
Network Layer IETF IPv6		**Network Layer** IETF IPv6
Data Link Layer Wide Area Wireless WAN		**Data Link Layer** Wide Area Wireless WAN
Physical Layer Wide Area Wireless WAN		**Physical Layer** Wide Area Wireless WAN

* IEEE 1609.2 is an available standard to consider depending on physical device in the vehicle.

Figure 258 F: service patrol incident status / S: Ohio DOT Safety Patrol Vehicles -> D: Ohio DOT Statewide ATMS / P: WAW-ASN1

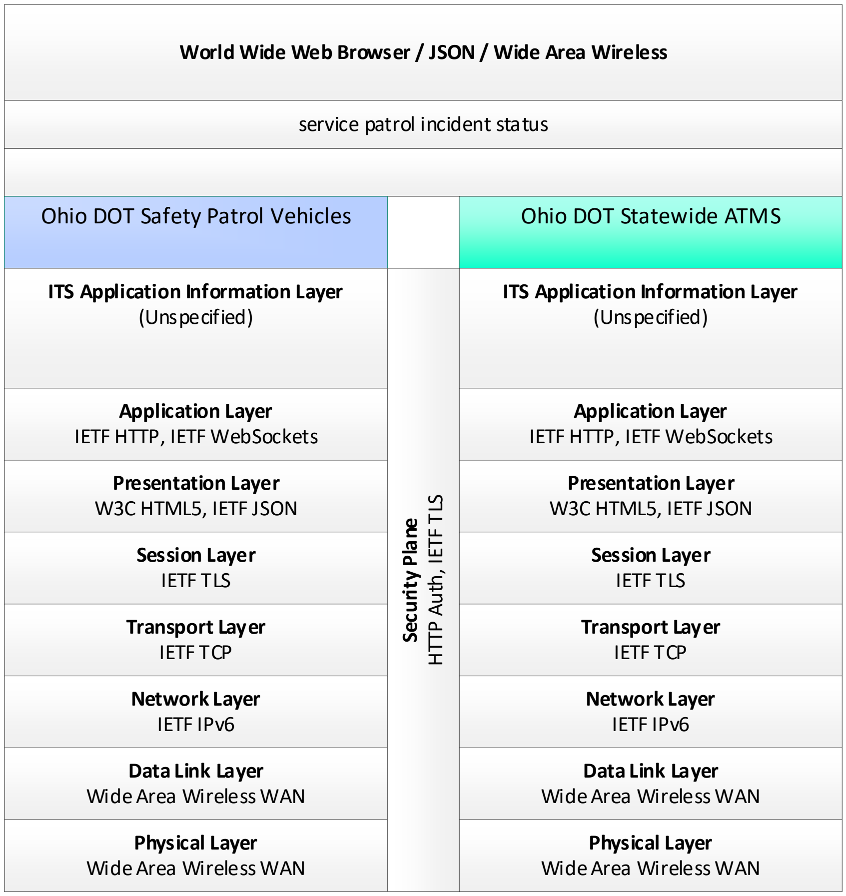


Figure 259 F: service patrol incident status / S: Ohio DOT Safety Patrol Vehicles -> D: Ohio DOT Statewide ATMS / P: WAW-WWWBrowser-JSON

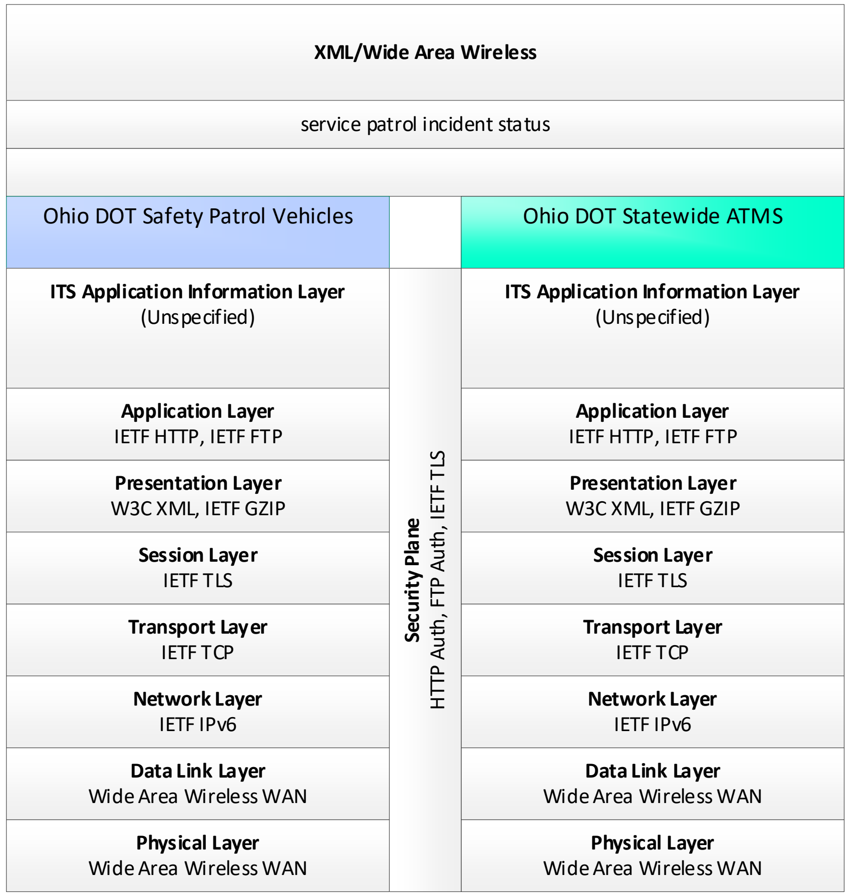
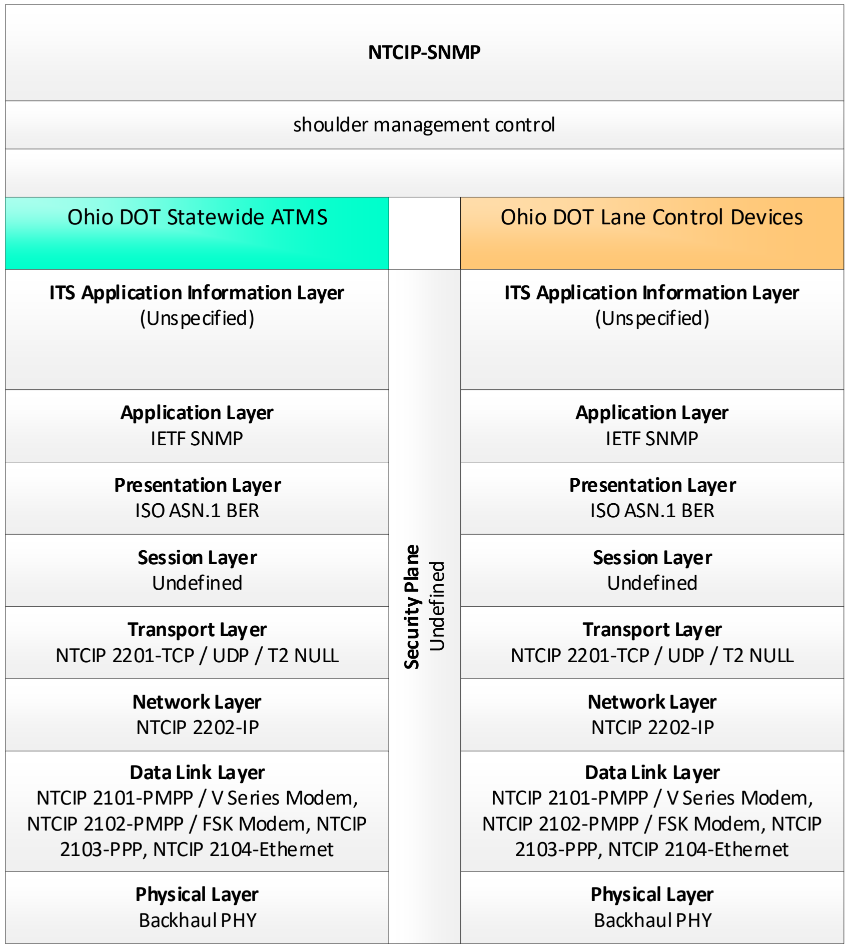
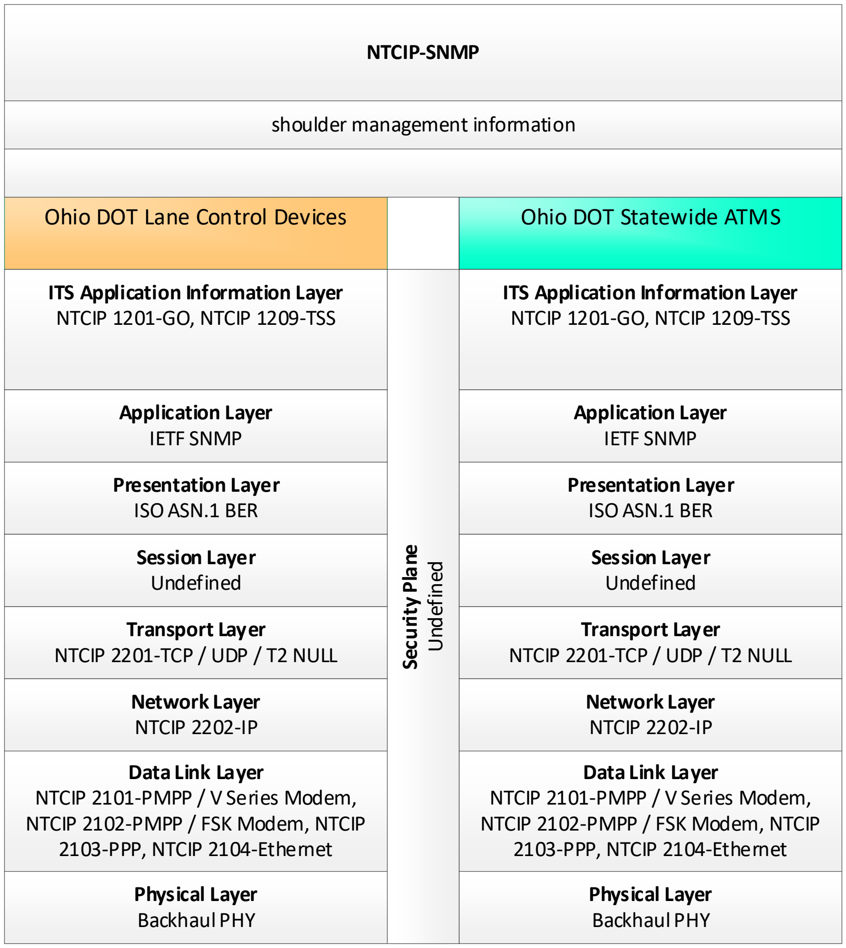


Figure 260 F: service patrol incident status / S: Ohio DOT Safety Patrol Vehicles -> D: Ohio DOT Statewide ATMS / P: WAW-XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 261 F: shoulder management control / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Lane Control Devices / P: NTCIP-SNMP



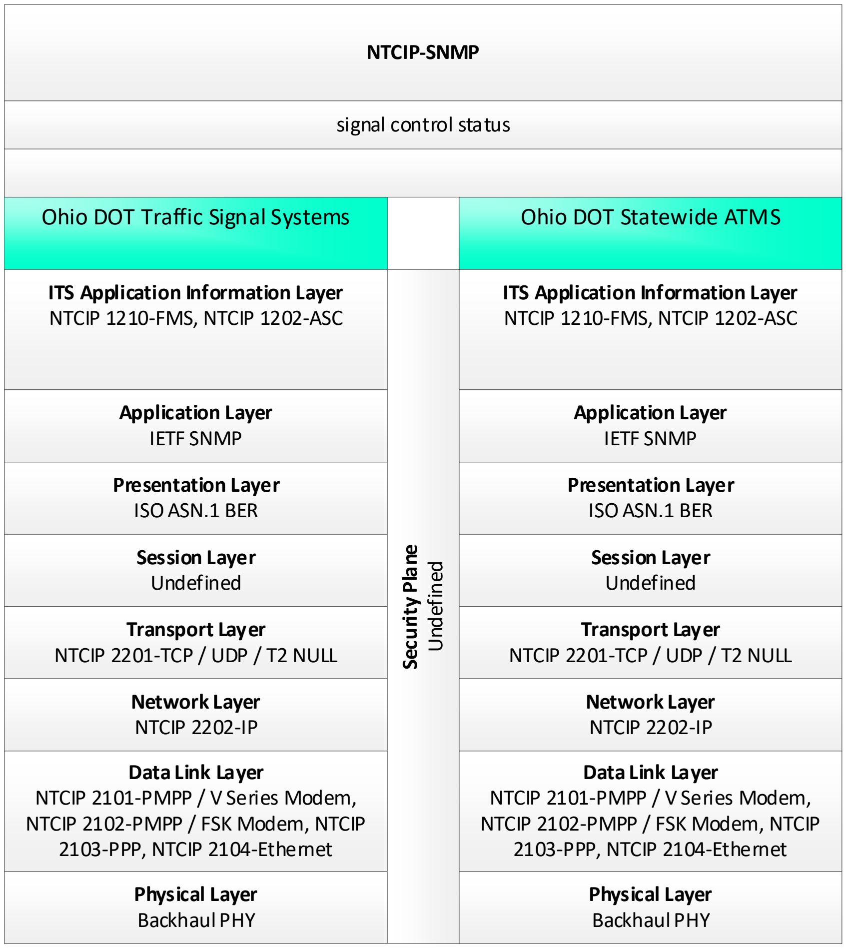
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 262 F: shoulder management information / S: Ohio DOT Lane Control Devices -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP

NTCIP-SNMP		
signal control commands		
Ohio DOT Statewide ATMS		**Ohio DOT Traffic Signal Systems**
ITS Application Information Layer NTCIP 1210-FMS, NTCIP 1202-ASC, NTCIP 1211-SCP	**Security Plane** Undefined	**ITS Application Information Layer** NTCIP 1210-FMS, NTCIP 1202-ASC, NTCIP 1211-SCP
Application Layer IETF SNMP		**Application Layer** IETF SNMP
Presentation Layer ISO ASN.1 BER		**Presentation Layer** ISO ASN.1 BER
Session Layer Undefined		**Session Layer** Undefined
Transport Layer NTCIP 2201-TCP / UDP / T2 NULL		**Transport Layer** NTCIP 2201-TCP / UDP / T2 NULL
Network Layer NTCIP 2202-IP		**Network Layer** NTCIP 2202-IP
Data Link Layer NTCIP 2101-PMPP / V Series Modem, NTCIP 2102-PMPP / FSK Modem, NTCIP 2103-PPP, NTCIP 2104-Ethernet		**Data Link Layer** NTCIP 2101-PMPP / V Series Modem, NTCIP 2102-PMPP / FSK Modem, NTCIP 2103-PPP, NTCIP 2104-Ethernet
Physical Layer Backhaul PHY		**Physical Layer** Backhaul PHY

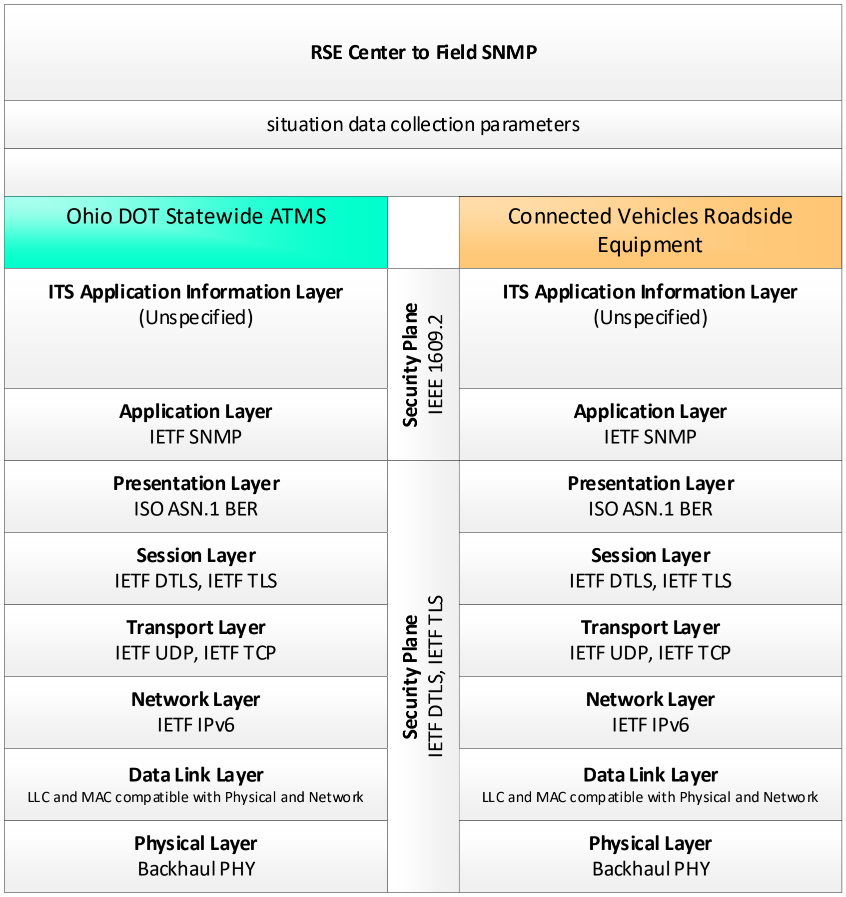
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 263 F: signal control commands / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Traffic Signal Systems / P: NTCIP-SNMP



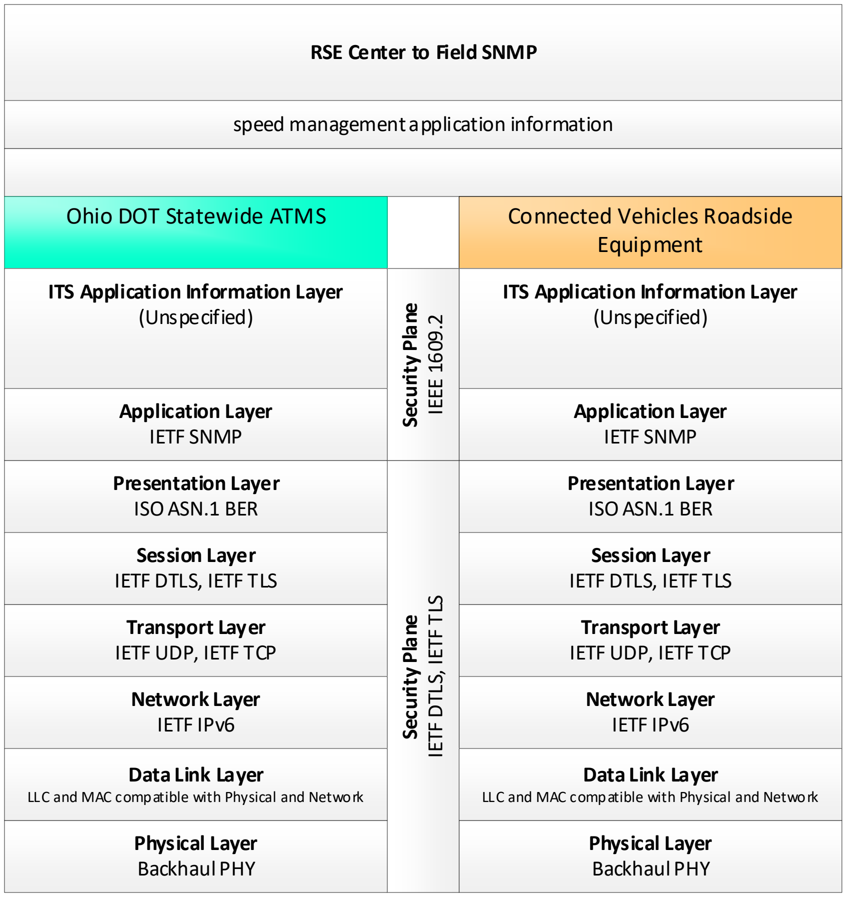
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 264 F: signal control status / S: Ohio DOT Traffic Signal Systems -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP



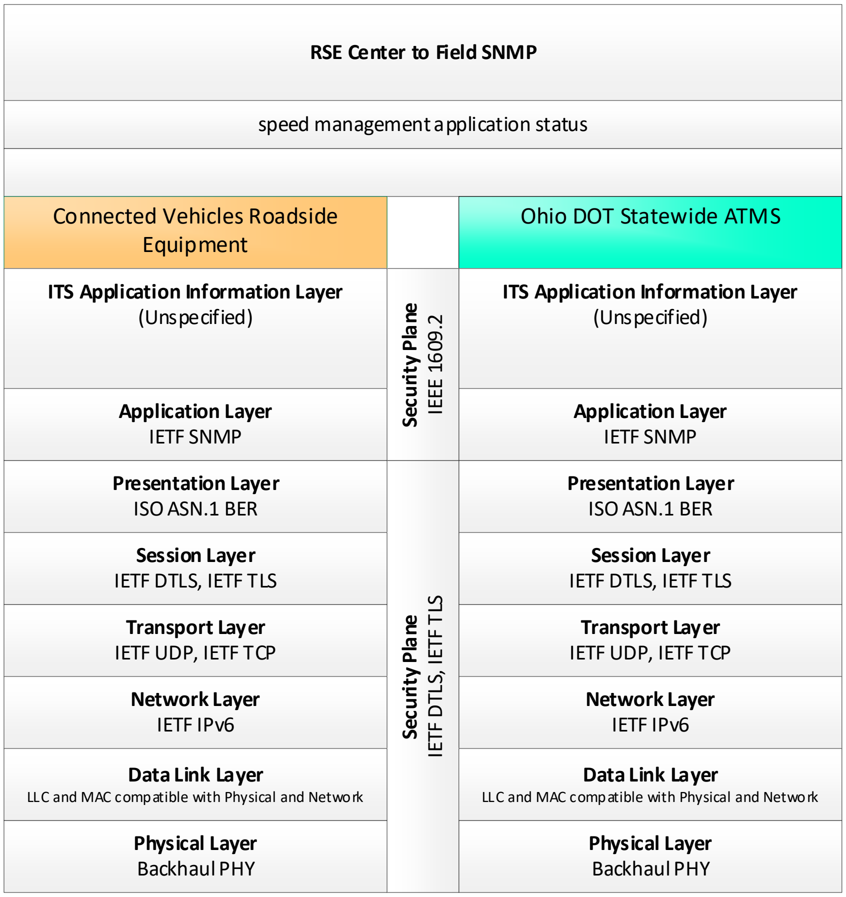
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 265 F: situation data collection parameters / S: Ohio DOT Statewide ATMS -> D: Connected Vehicles Roadside Equipment / P: RSE-C2F-SNMP



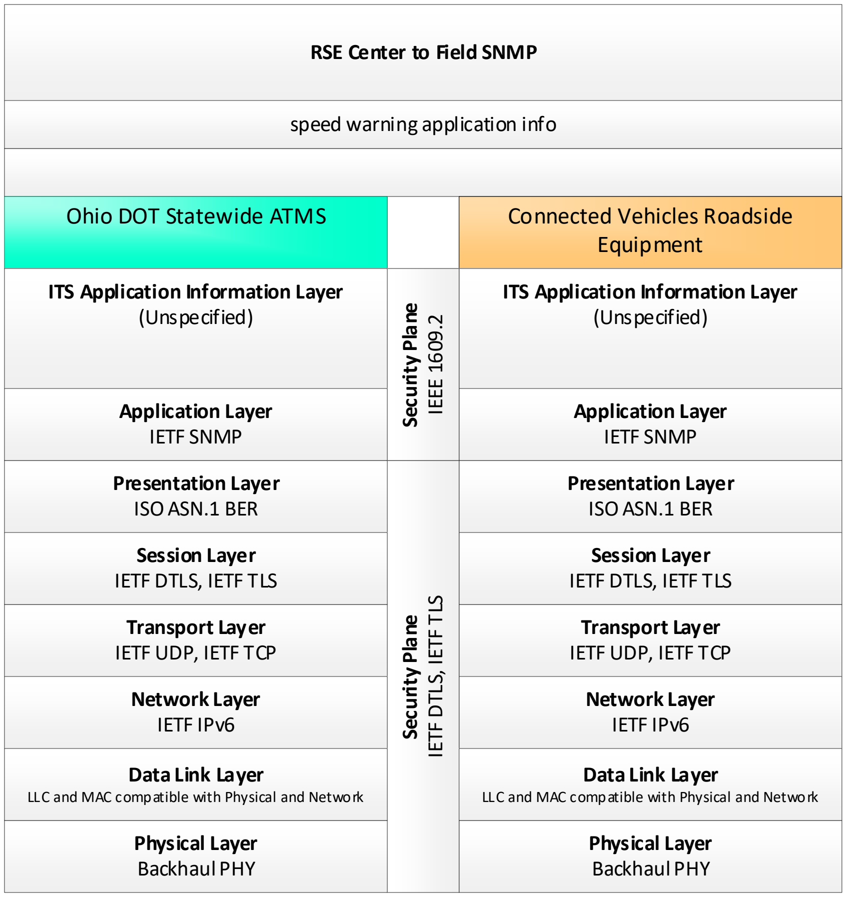
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 266 F: speed management application information / S: Ohio DOT Statewide ATMS -> D: Connected Vehicles Roadside Equipment / P: RSE-C2F-SNMP



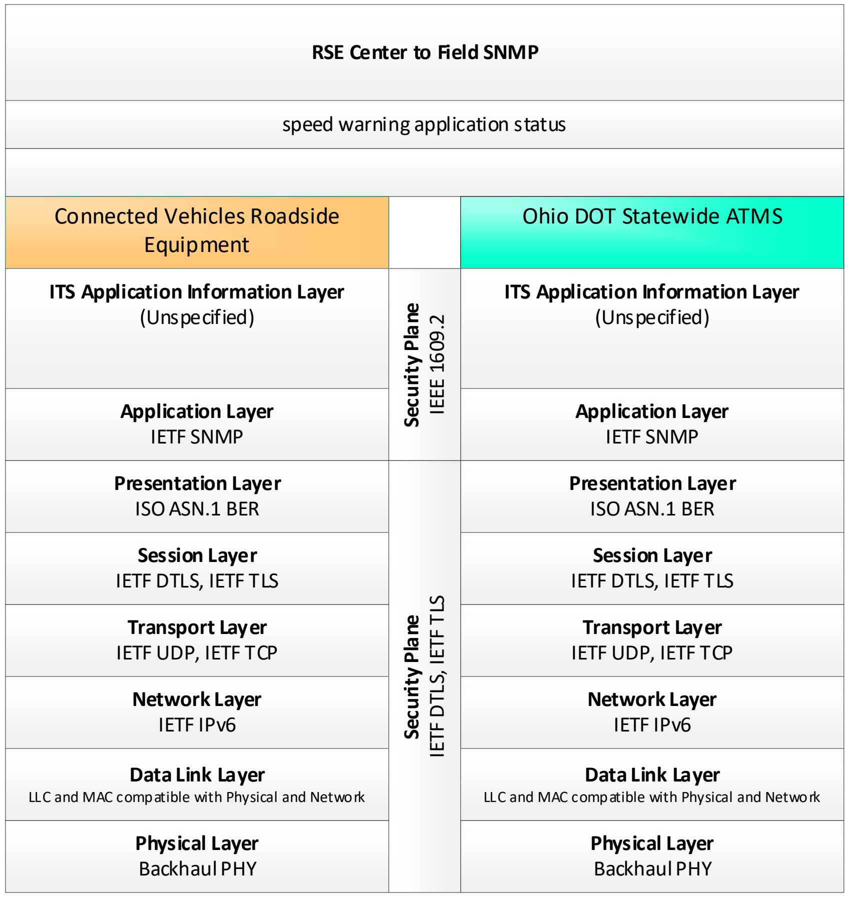
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 267 F: speed management application status / S: Connected Vehicles Roadside Equipment -> D: Ohio DOT Statewide ATMS / P: RSE-C2F-SNMP



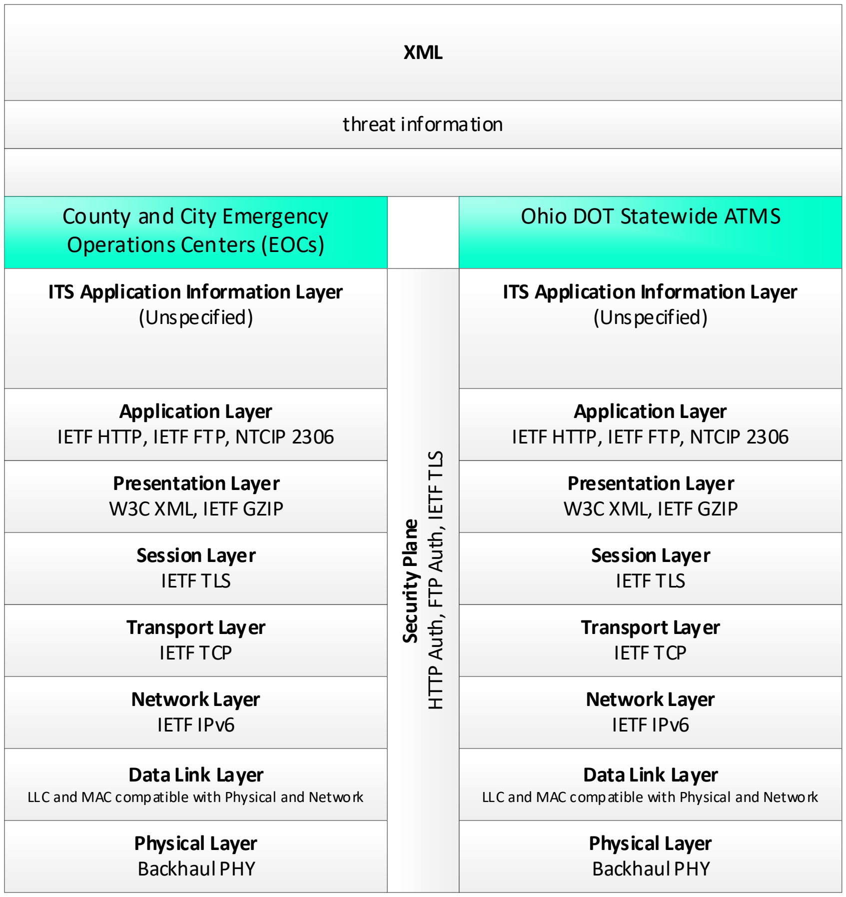
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 268 F: speed warning application info / S: Ohio DOT Statewide ATMS -> D: Connected Vehicles Roadside Equipment / P: RSE-C2F-SNMP



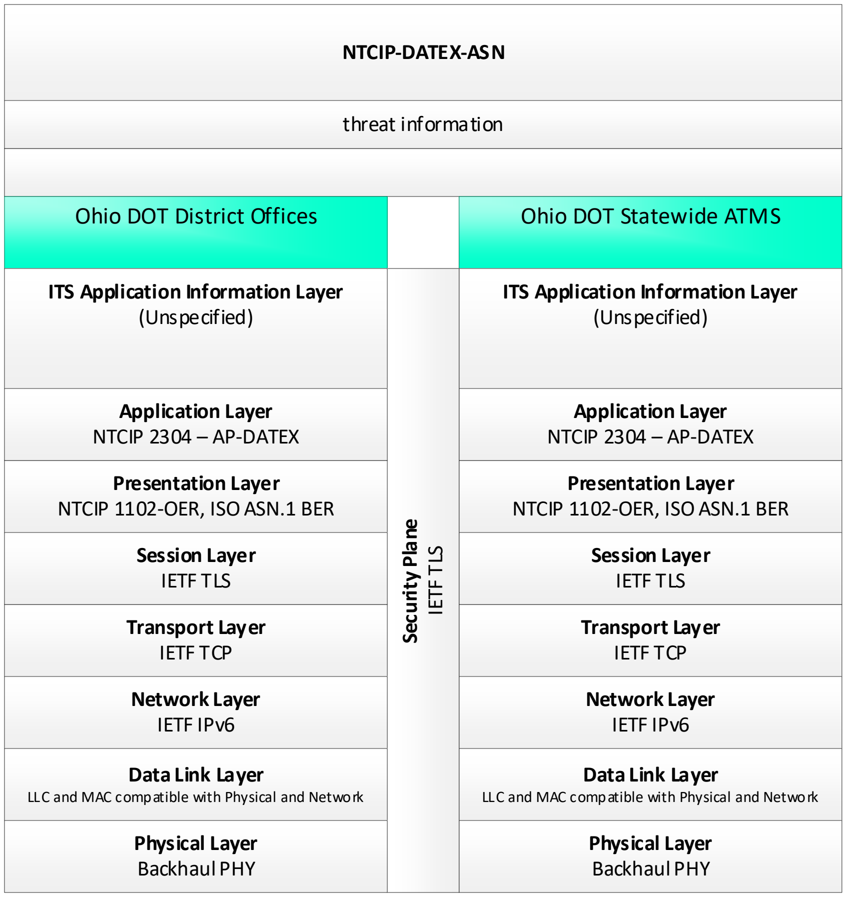
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 269 F: speed warning application status / S: Connected Vehicles Roadside Equipment -> D: Ohio DOT Statewide ATMS / P: RSE-C2F-SNMP



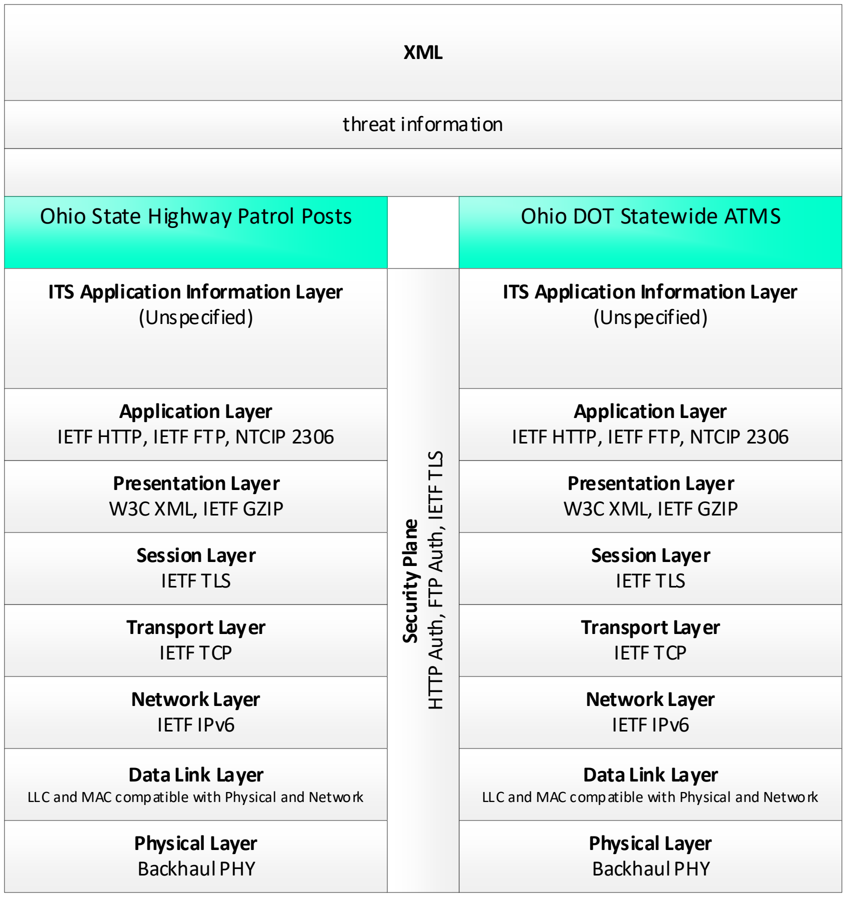
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 270 F: threat information / S: County and City Emergency Operations Centers (EOCs) -> D: Ohio DOT Statewide ATMS / P: XML



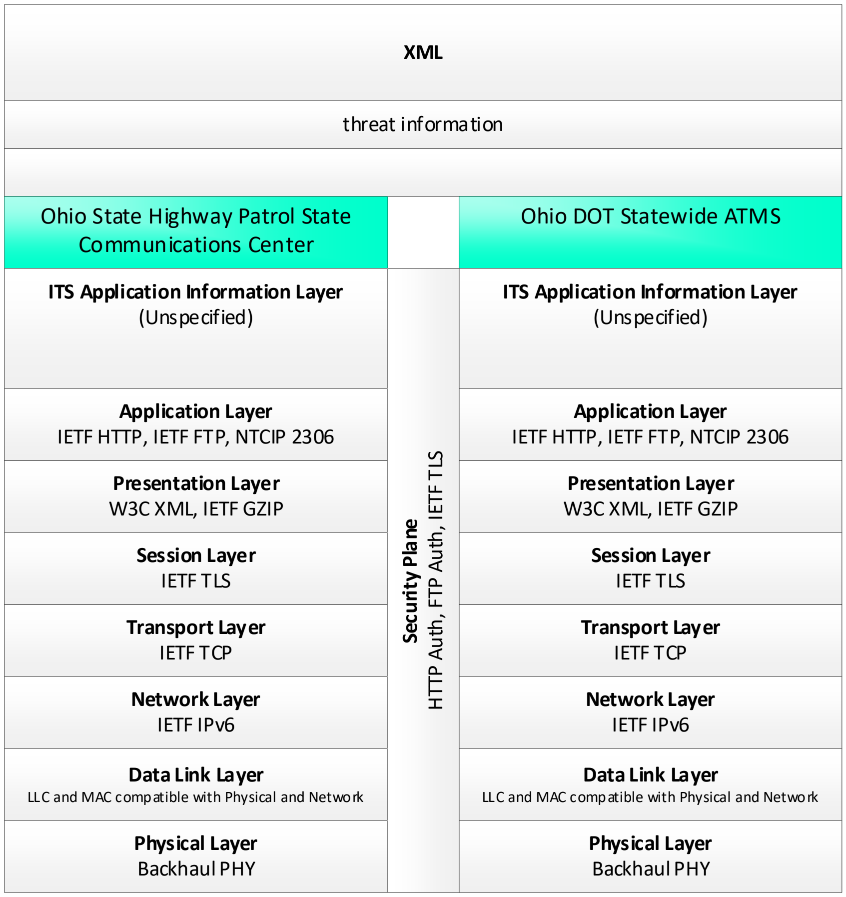
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 271 F: threat information / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



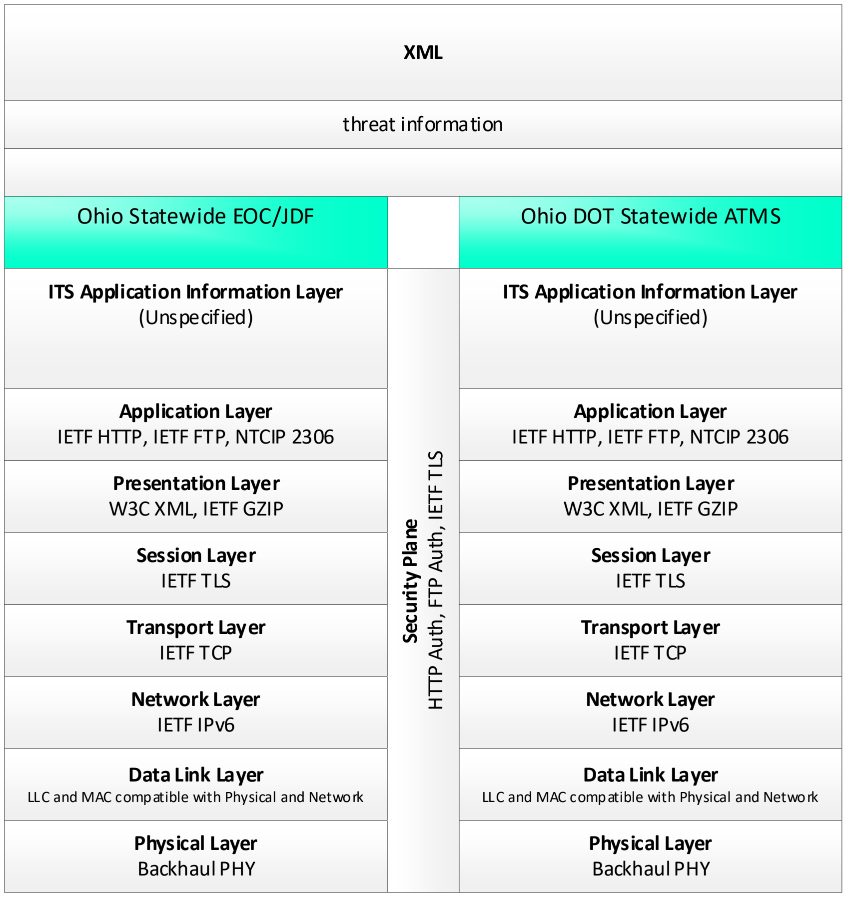
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 272 F: threat information / S: Ohio State Highway Patrol Posts -> D: Ohio DOT Statewide ATMS / P: XML



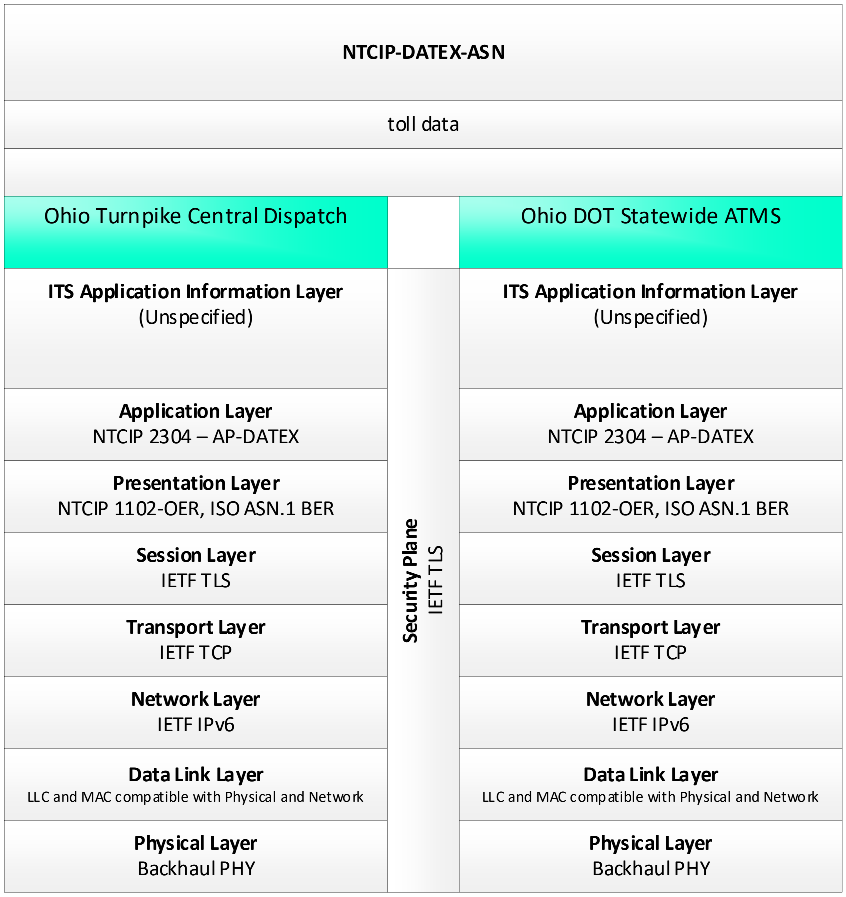
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 273 F: threat information / S: Ohio State Highway Patrol State Communications Center -> D: Ohio DOT Statewide ATMS / P: XML



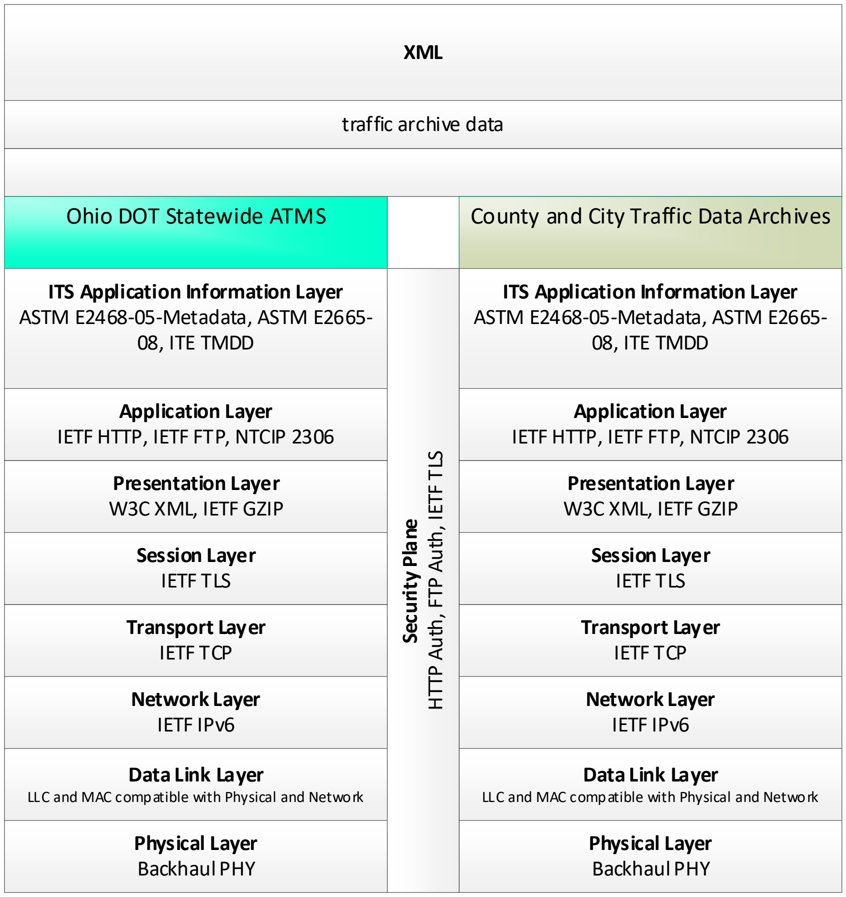
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 274 F: threat information / S: Ohio Statewide EOC/JDF -> D: Ohio DOT Statewide ATMS / P: XML



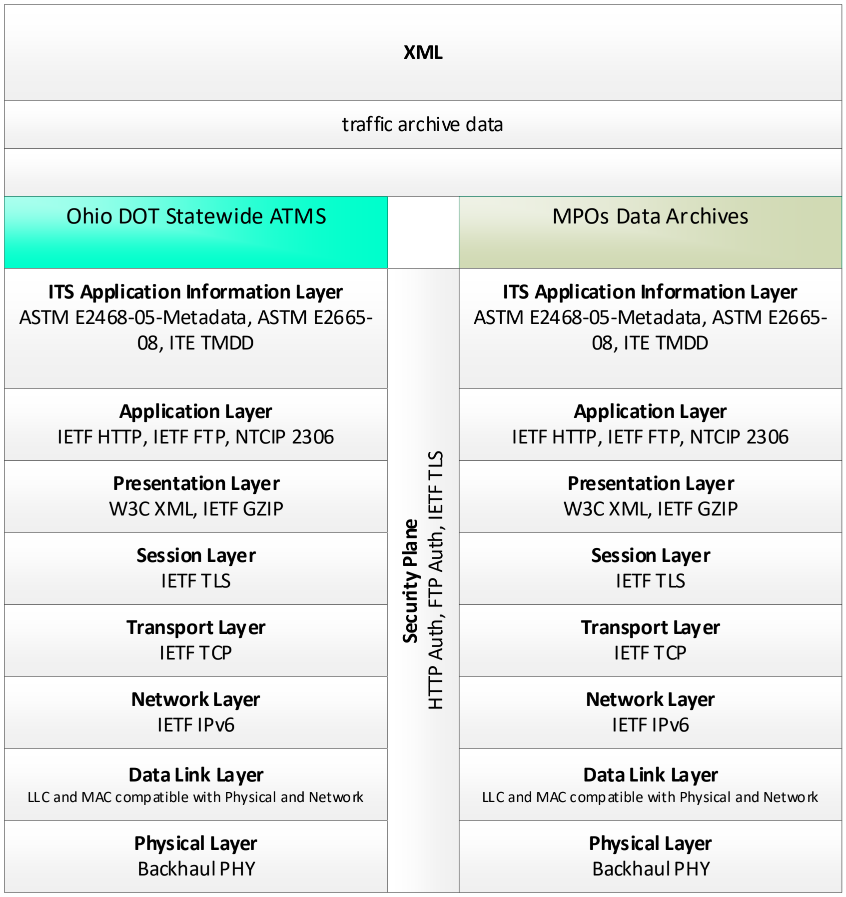
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 275 F: toll data / S: Ohio Turnpike Central Dispatch -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



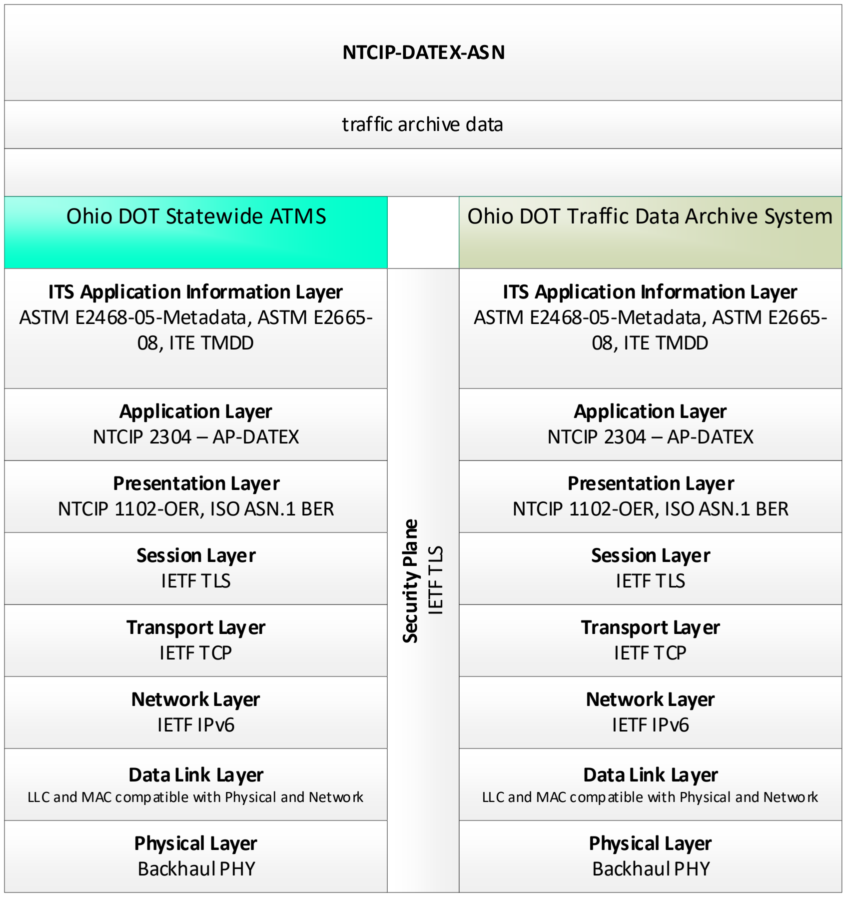
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 276 F: traffic archive data / S: Ohio DOT Statewide ATMS -> D: County and City Traffic Data Archives / P: XML



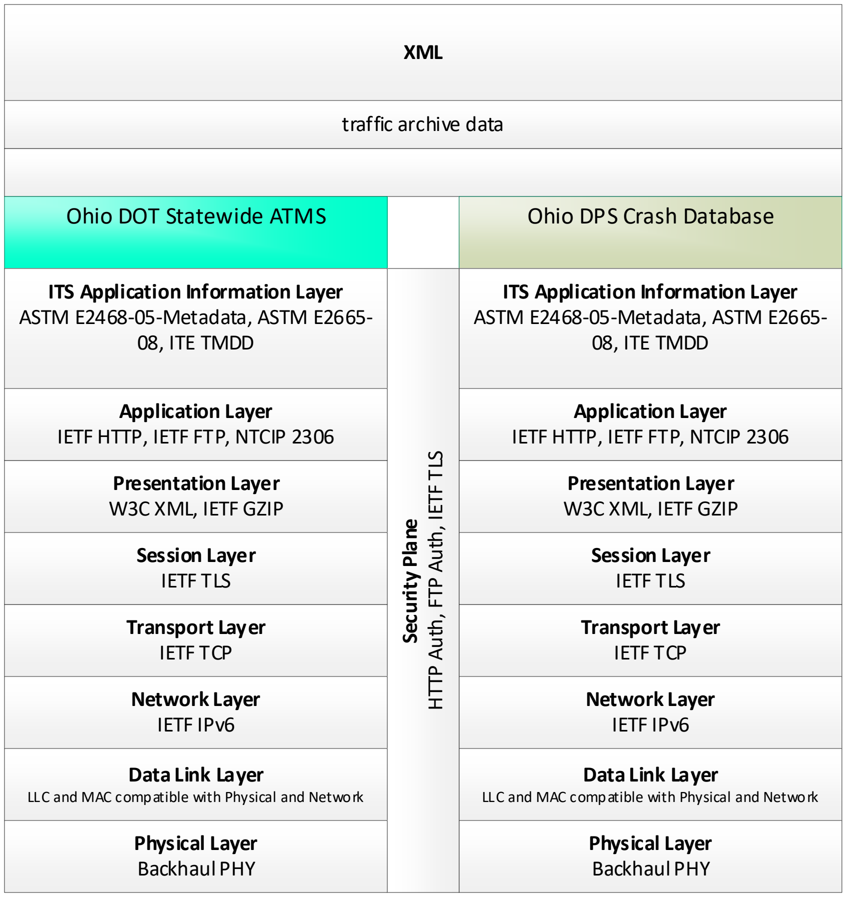
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 277 F: traffic archive data / S: Ohio DOT Statewide ATMS -> D: MPOs Data Archives / P: XML



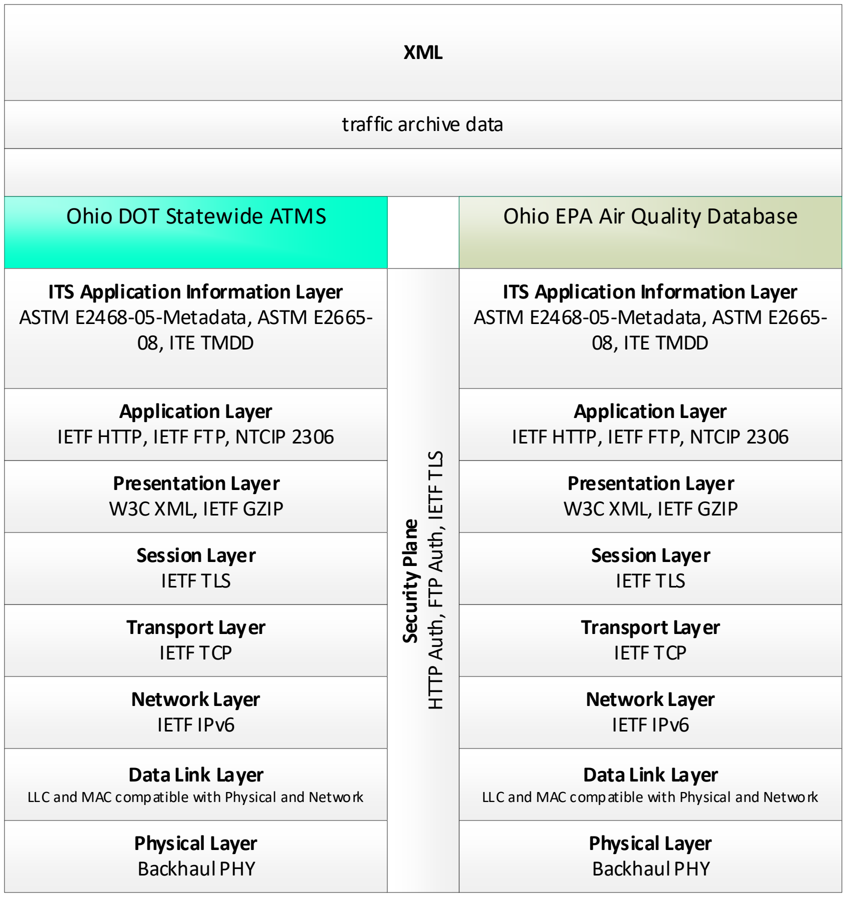
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 278 F: traffic archive data / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Traffic Data Archive System / P: NTCIP-DATEX



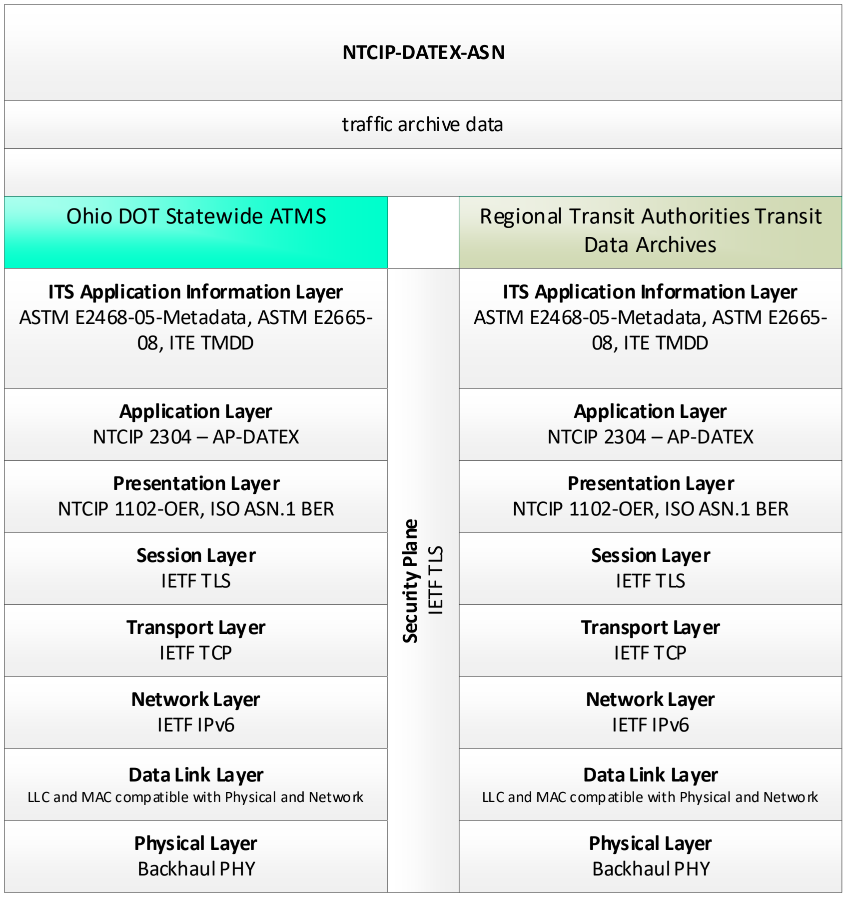
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 279 F: traffic archive data / S: Ohio DOT Statewide ATMS -> D: Ohio DPS Crash Database / P: XML



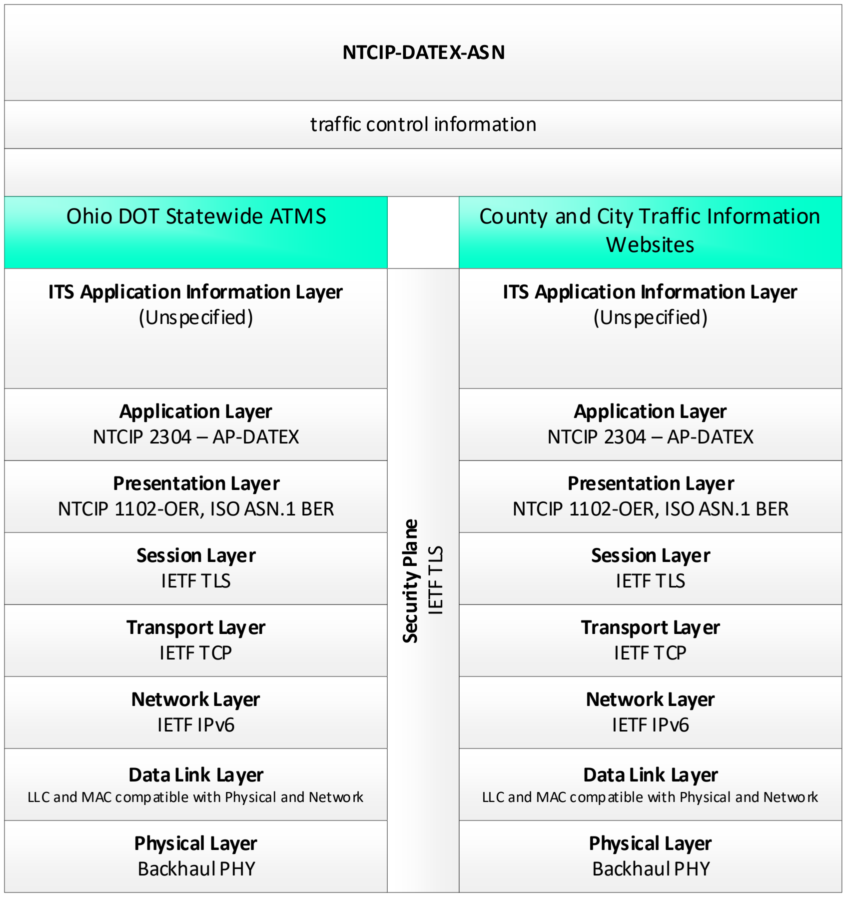
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 280 F: traffic archive data / S: Ohio DOT Statewide ATMS -> D: Ohio EPA Air Quality Database / P: XML



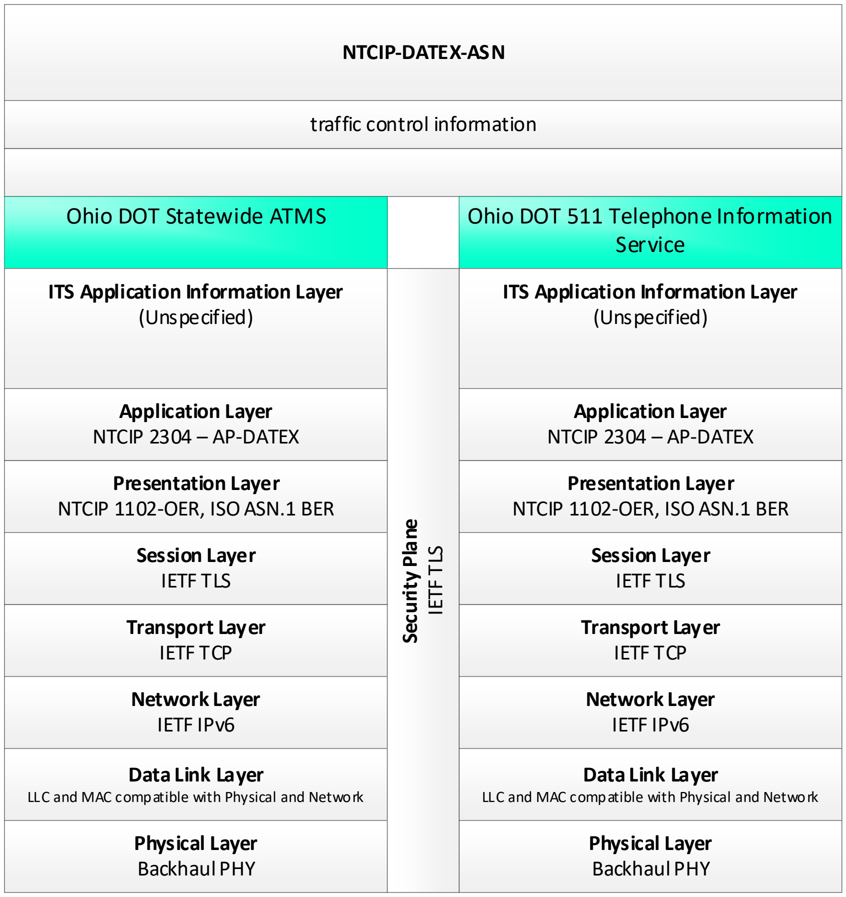
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 281 F: traffic archive data / S: Ohio DOT Statewide ATMS -> D: Regional Transit Authorities Transit Data Archives / P: XML



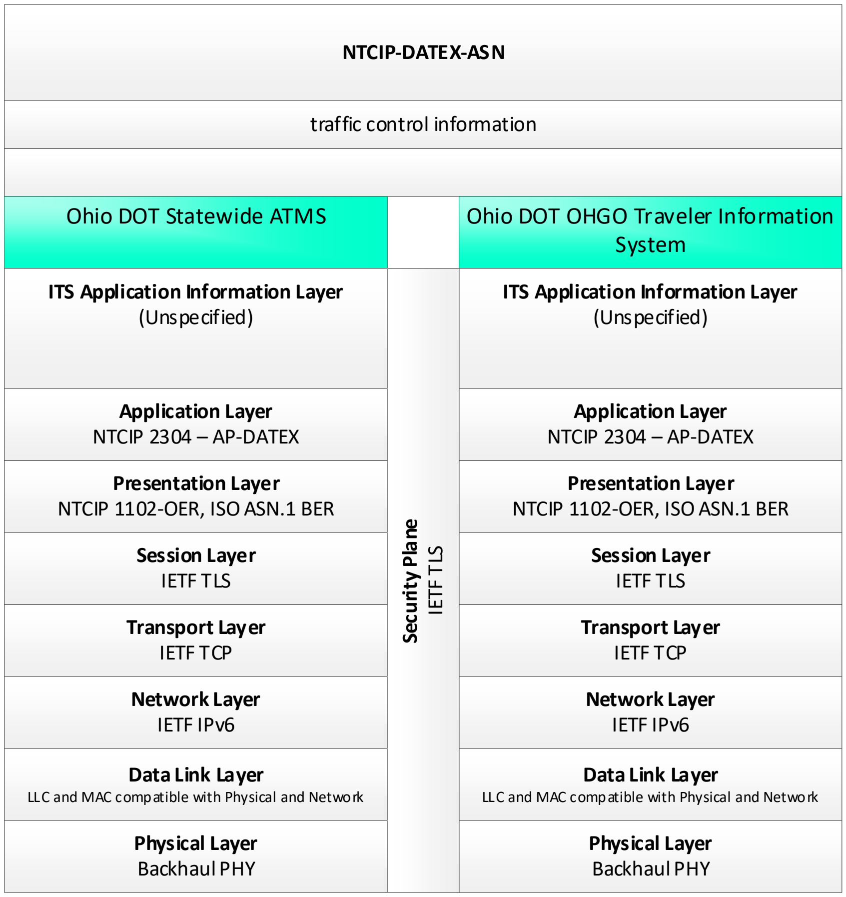
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 282 F: traffic control information / S: Ohio DOT Statewide ATMS -> D: County and City Traffic Information Websites / P: NTCIP-DATEX



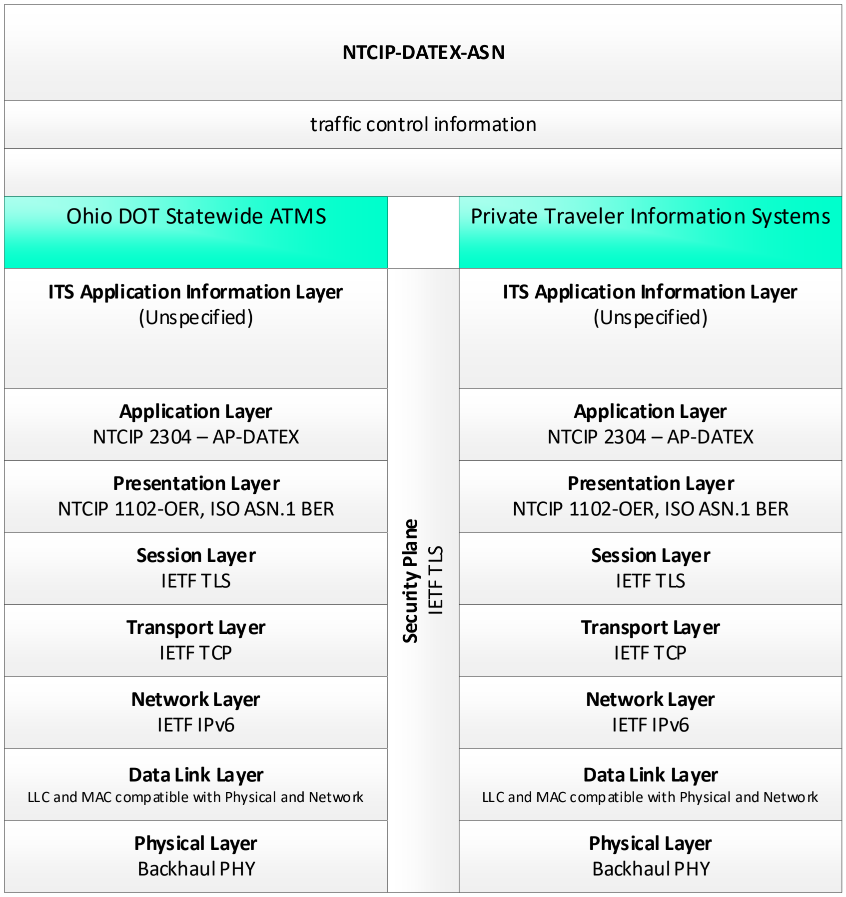
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 283 F: traffic control information / S: Ohio DOT Statewide ATMS -> D: Ohio DOT 511 Telephone Information Service / P: NTCIP-DATEX



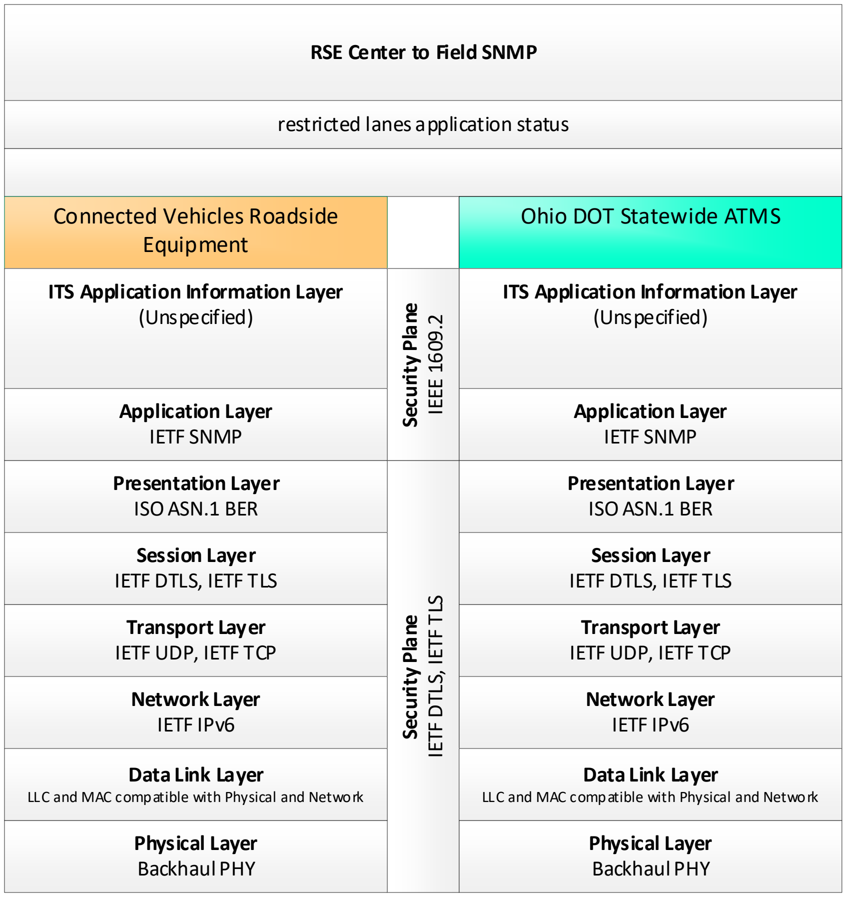
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 284 F: traffic control information / S: Ohio DOT Statewide ATMS -> D: Ohio DOT OHGO Traveler Information System / P: NTCIP-DATEX



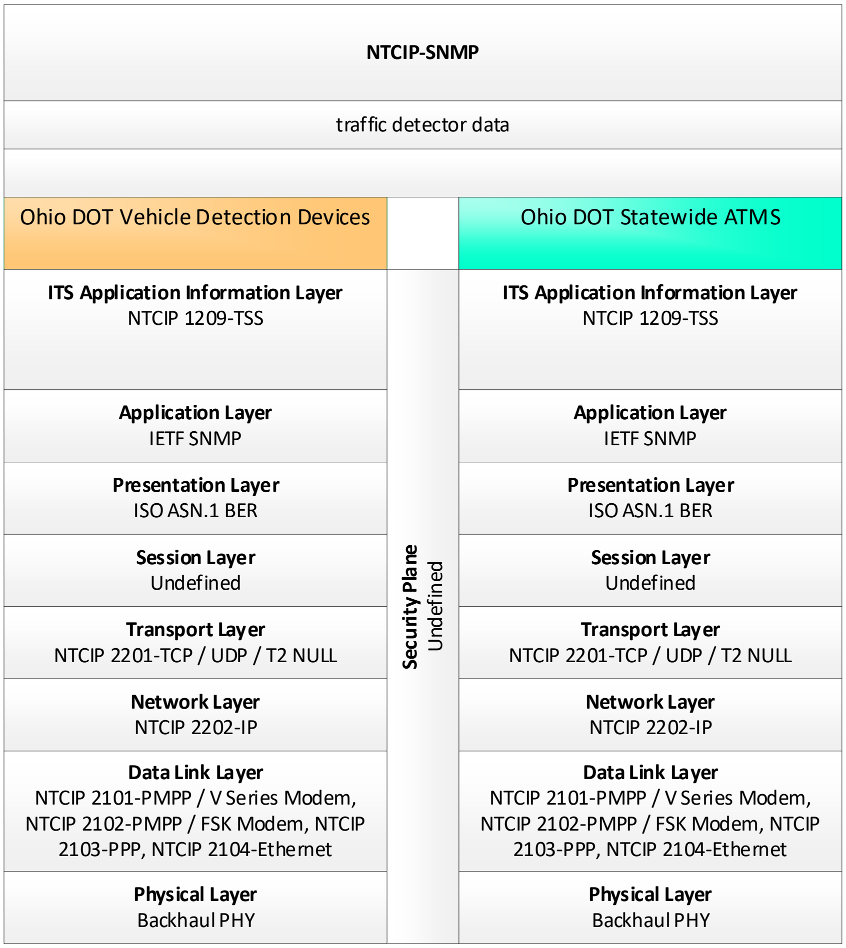
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 285 F: traffic control information / S: Ohio DOT Statewide ATMS -> D: Private Traveler Information Systems / P: NTCIP-DATEX



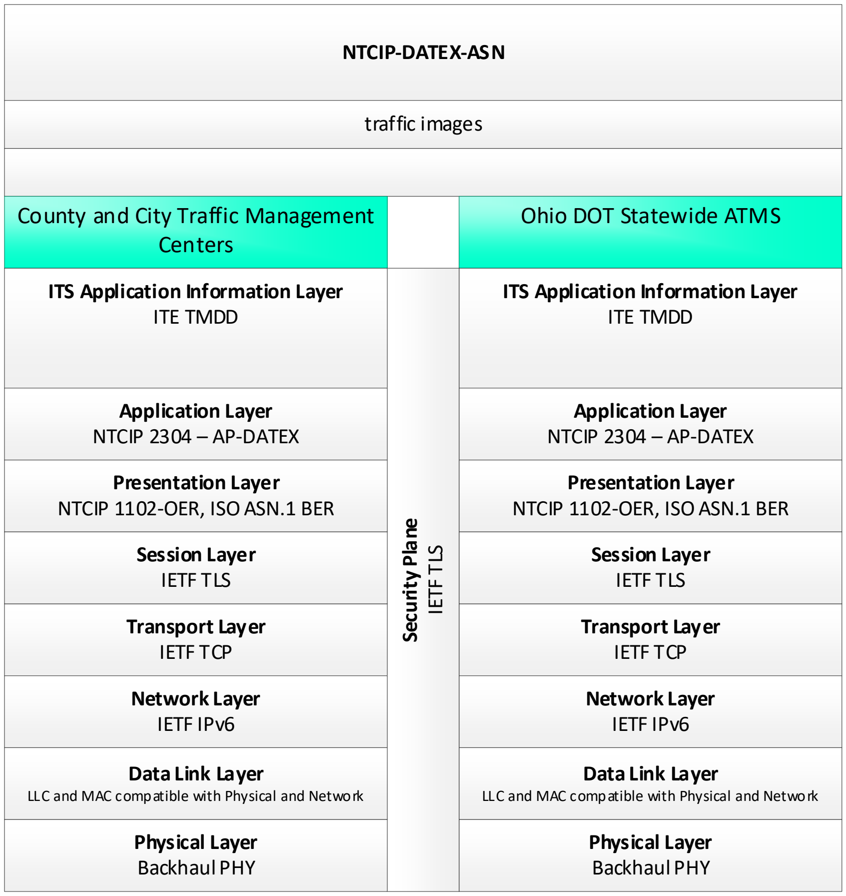
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 286 F: traffic detector control / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Vehicle Detection Devices / P: NTCIP-SNMP



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

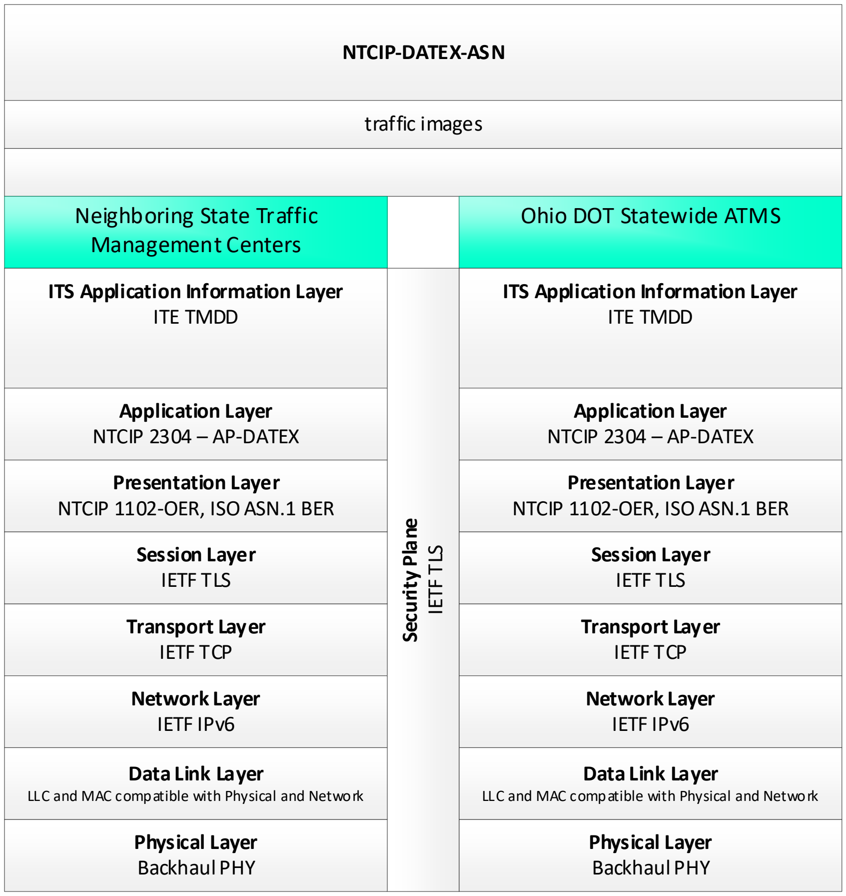
Figure 287 F: traffic detector data / S: Ohio DOT Vehicle Detection Devices -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a link to where the images may be found.

Figure 288 F: traffic images / S: County and City Traffic Management Centers -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a link to where the images may be found.

Figure 289 F: traffic images / S: Neighboring State Traffic Management Centers -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX

NTCIP-SNMP

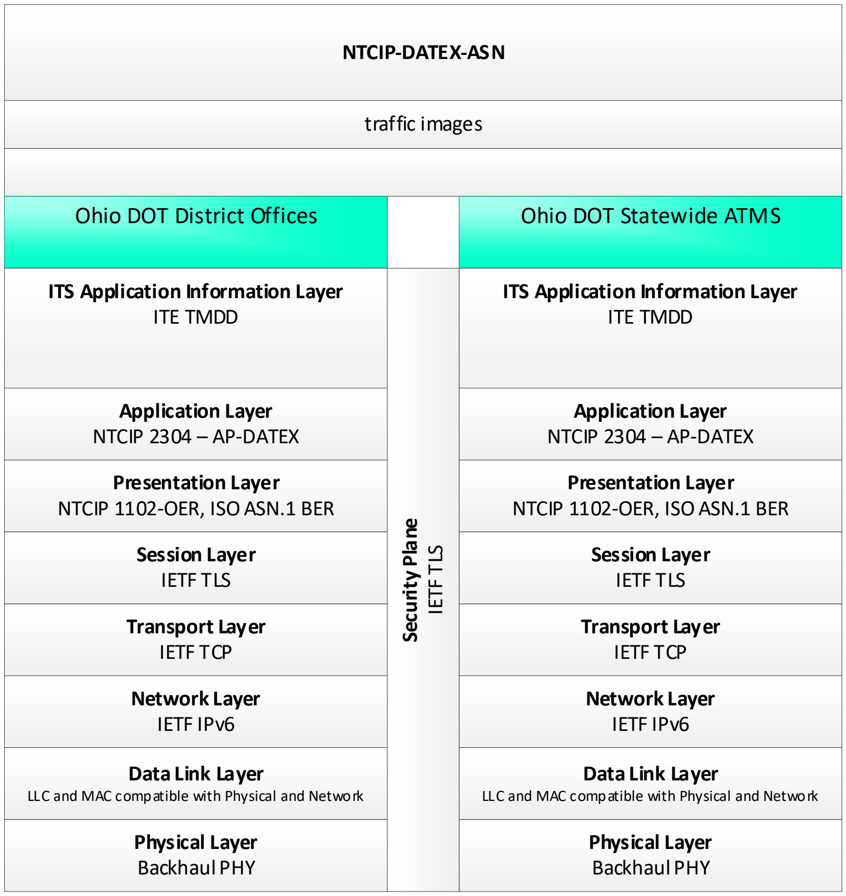
traffic images

Ohio DOT CCTV Cameras		Ohio DOT Statewide ATMS
ITS Application Information Layer NTCIP 1205-CCTV, NTCIP 1208-VS	**Security Plane** Undefined	**ITS Application Information Layer** NTCIP 1205-CCTV, NTCIP 1208-VS
Application Layer IETF SNMP		**Application Layer** IETF SNMP
Presentation Layer ISO ASN.1 BER		**Presentation Layer** ISO ASN.1 BER
Session Layer Undefined		**Session Layer** Undefined
Transport Layer NTCIP 2201-TCP / UDP / T2 NULL		**Transport Layer** NTCIP 2201-TCP / UDP / T2 NULL
Network Layer NTCIP 2202-IP		**Network Layer** NTCIP 2202-IP
Data Link Layer NTCIP 2101-PMPP / V Series Modem, NTCIP 2102-PMPP / FSK Modem, NTCIP 2103-PPP, NTCIP 2104-Ethernet		**Data Link Layer** NTCIP 2101-PMPP / V Series Modem, NTCIP 2102-PMPP / FSK Modem, NTCIP 2103-PPP, NTCIP 2104-Ethernet
Physical Layer Backhaul PHY		**Physical Layer** Backhaul PHY

* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a link to where the images may be found.

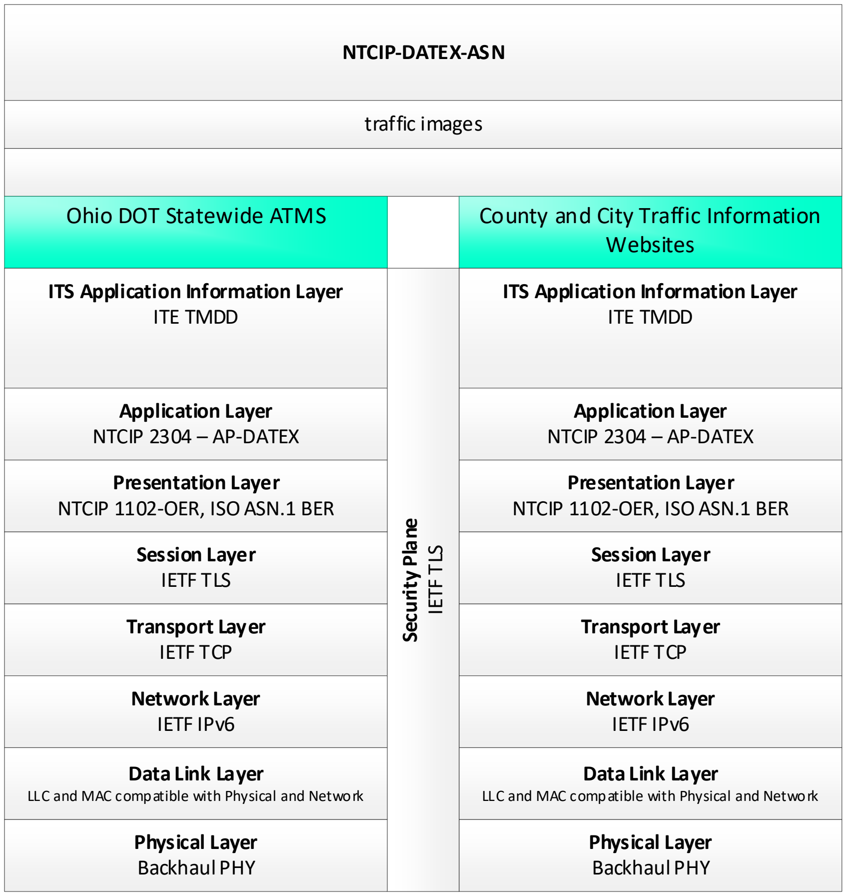
Figure 290 F: traffic images / S: Ohio DOT CCTV Cameras -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a link to where the images may be found.

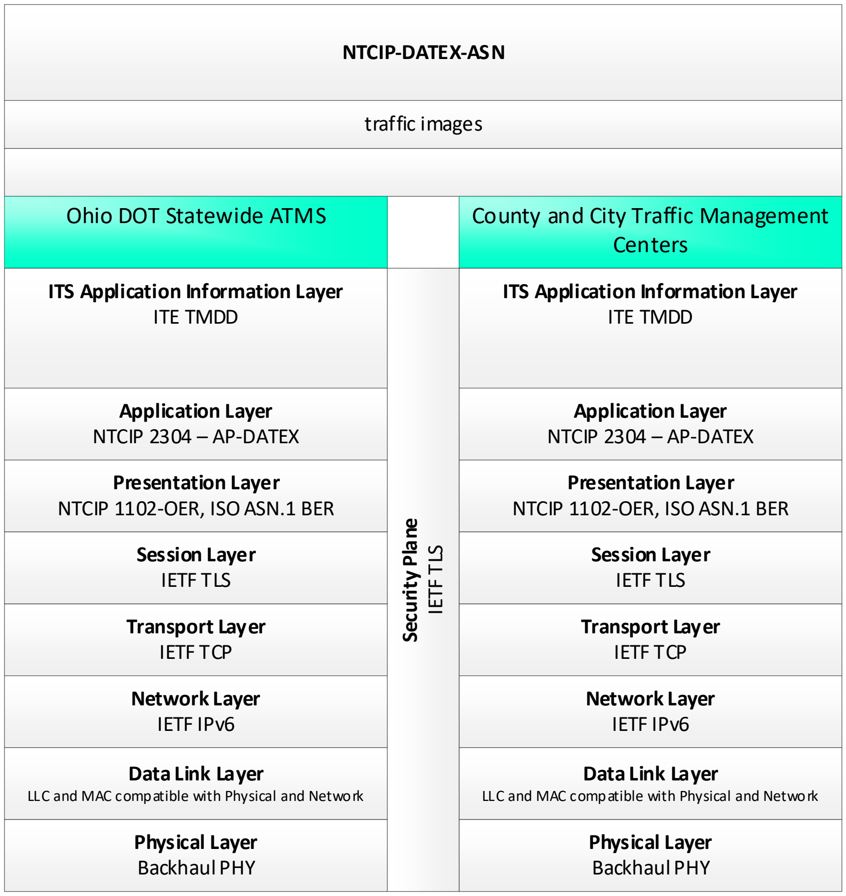
Figure 291 F: traffic images / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a link to where the images may be found.

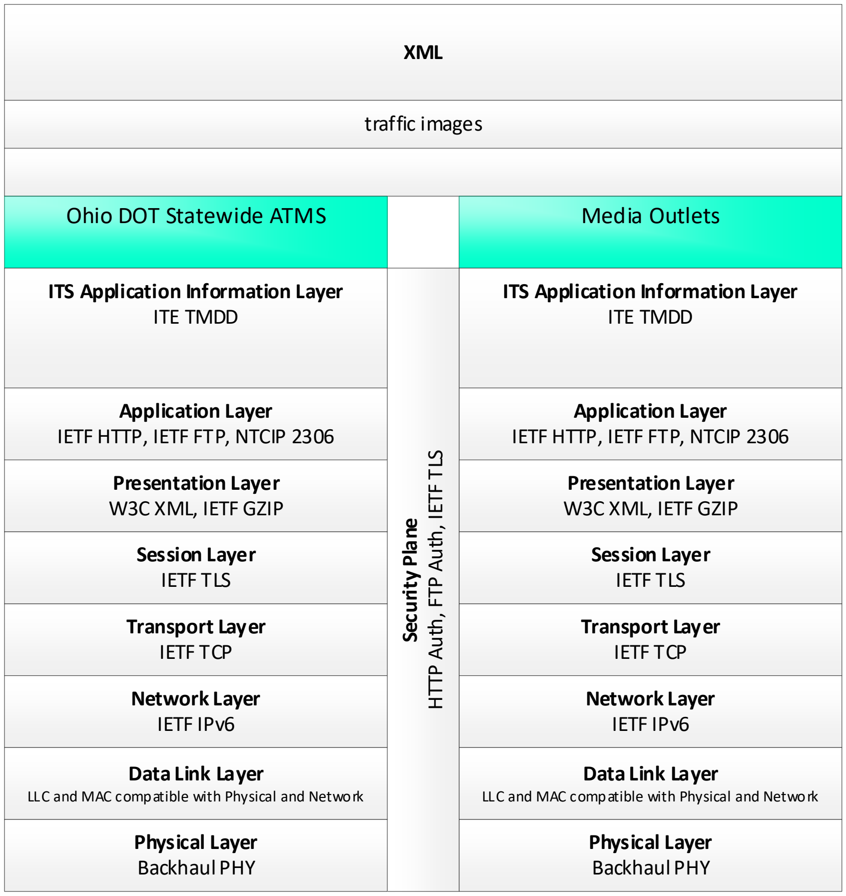
Figure 292 F: traffic images / S: Ohio DOT Statewide ATMS -> D: County and City Traffic Information Websites / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a link to where the images may be found.

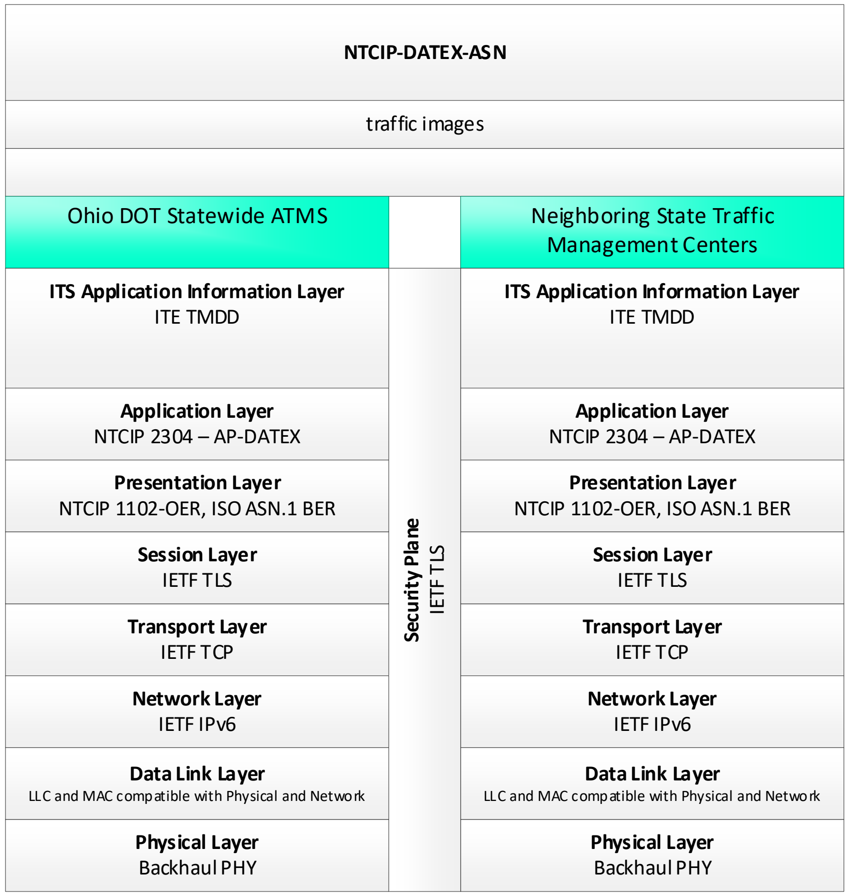
Figure 293 F: traffic images / S: Ohio DOT Statewide ATMS -> D: County and City Traffic Management Centers / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a

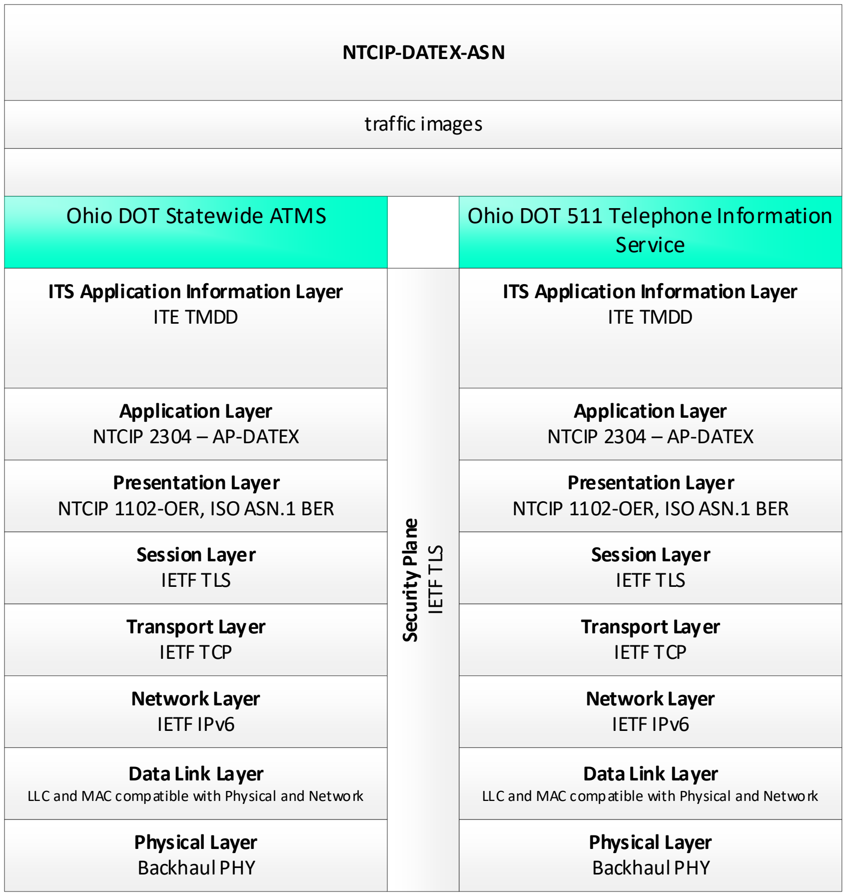
Figure 294 F: traffic images / S: Ohio DOT Statewide ATMS -> D: Media Outlets / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a link to where the images may be found.

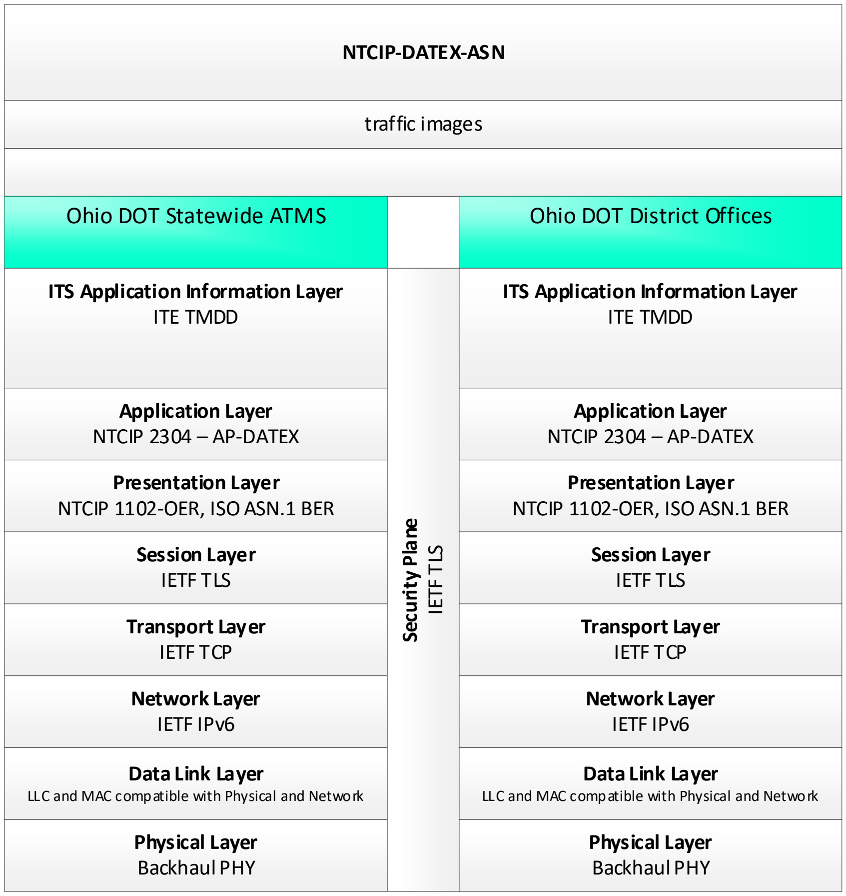
Figure 295 F: traffic images / S: Ohio DOT Statewide ATMS -> D: Neighboring State Traffic Management Centers / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a link to where the images may be found.

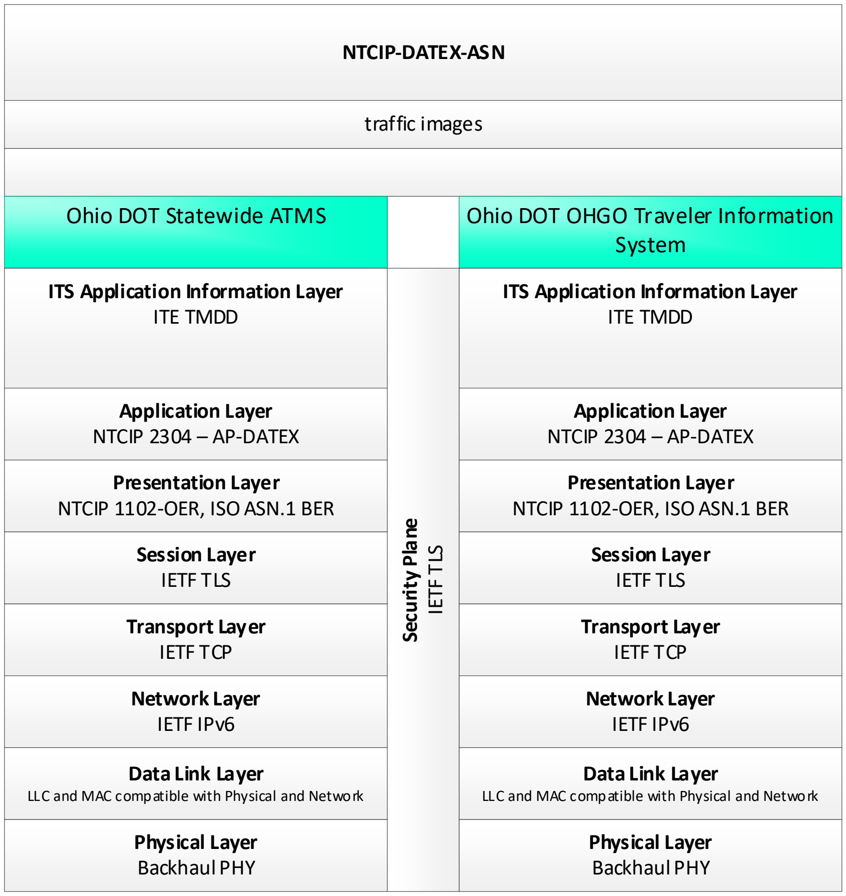
Figure 296 F: traffic images / S: Ohio DOT Statewide ATMS -> D: Ohio DOT 511 Telephone Information Service / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a link to where the images may be found.

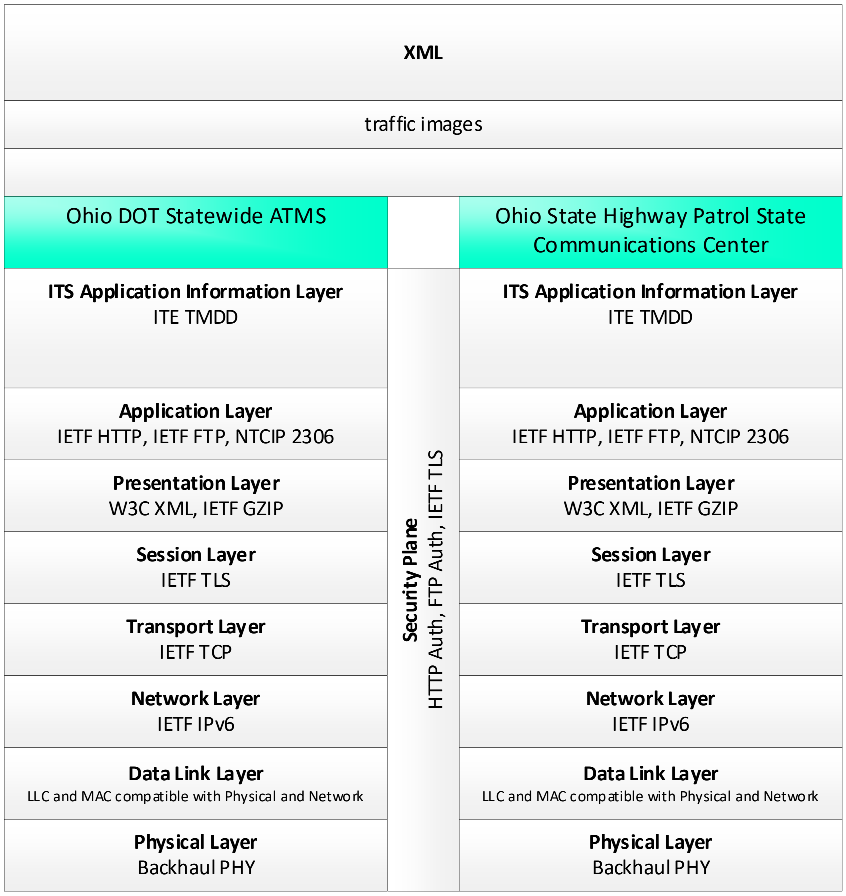
Figure 297 F: traffic images / S: Ohio DOT Statewide ATMS -> D: Ohio DOT District Offices / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a link to where the images may be found.

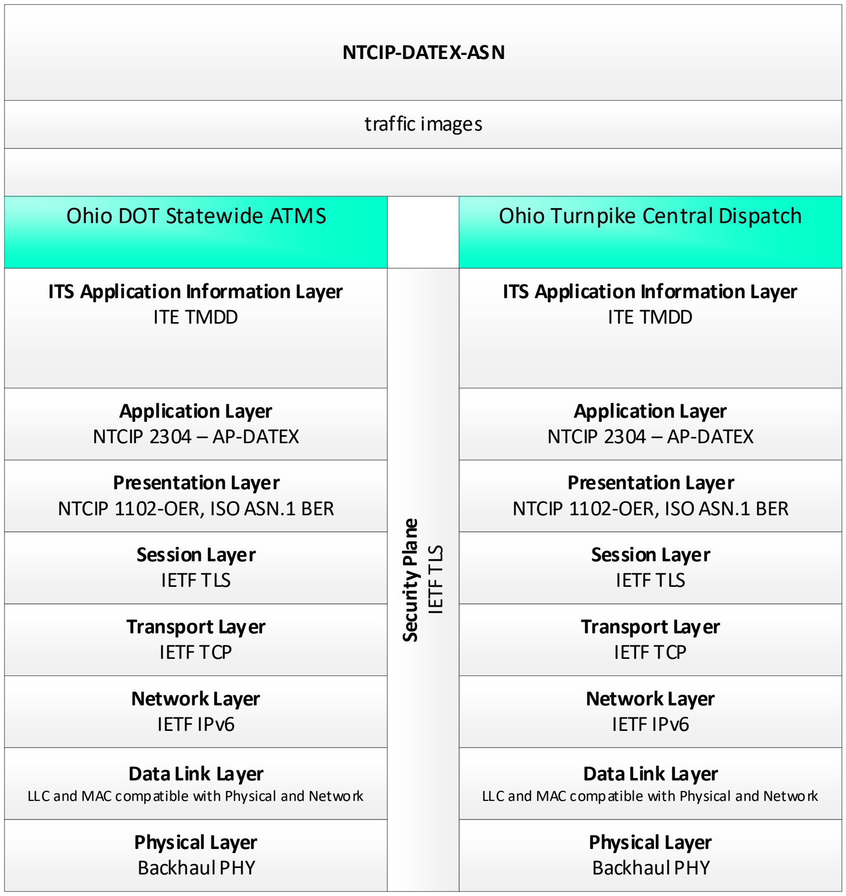
Figure 298 F: traffic images / S: Ohio DOT Statewide ATMS -> D: Ohio DOT OHGO Traveler Information System / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a

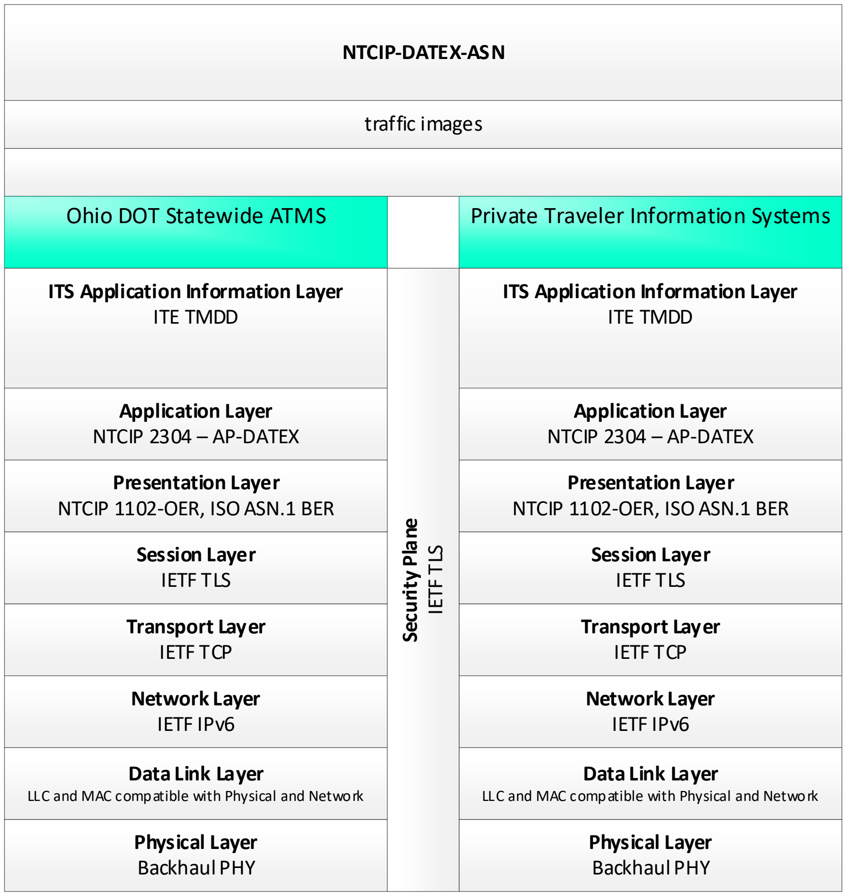
Figure 299 F: traffic images / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol State Communications Center / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a link to where the images may be found.

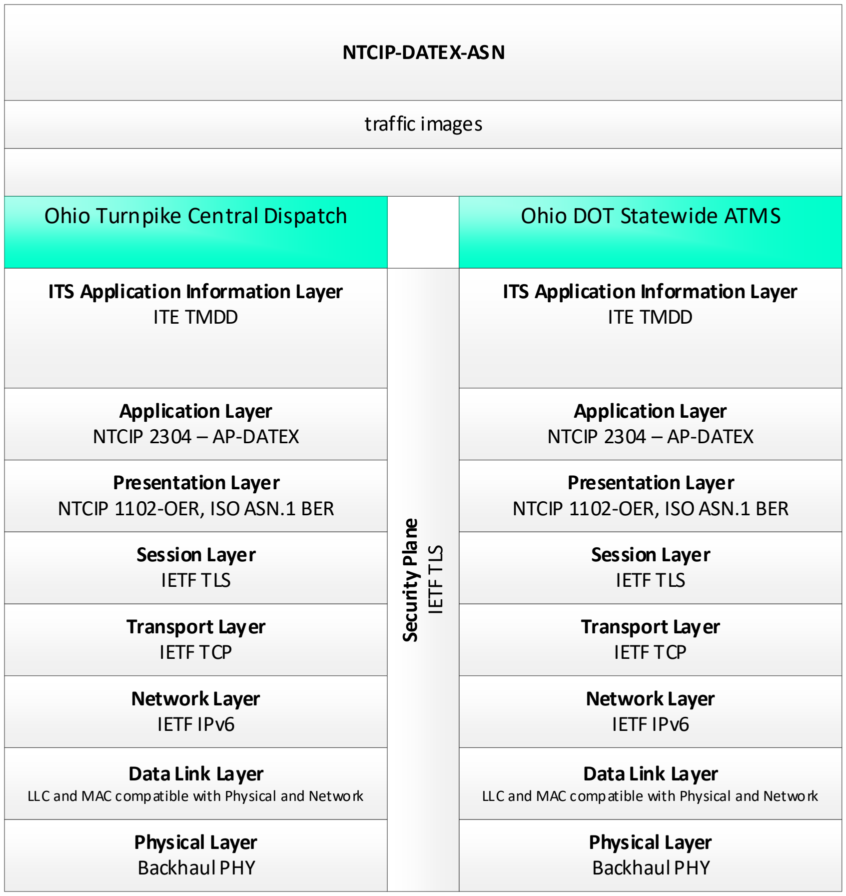
Figure 300 F: traffic images / S: Ohio DOT Statewide ATMS -> D: Ohio Turnpike Central Dispatch / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a link to where the images may be found.

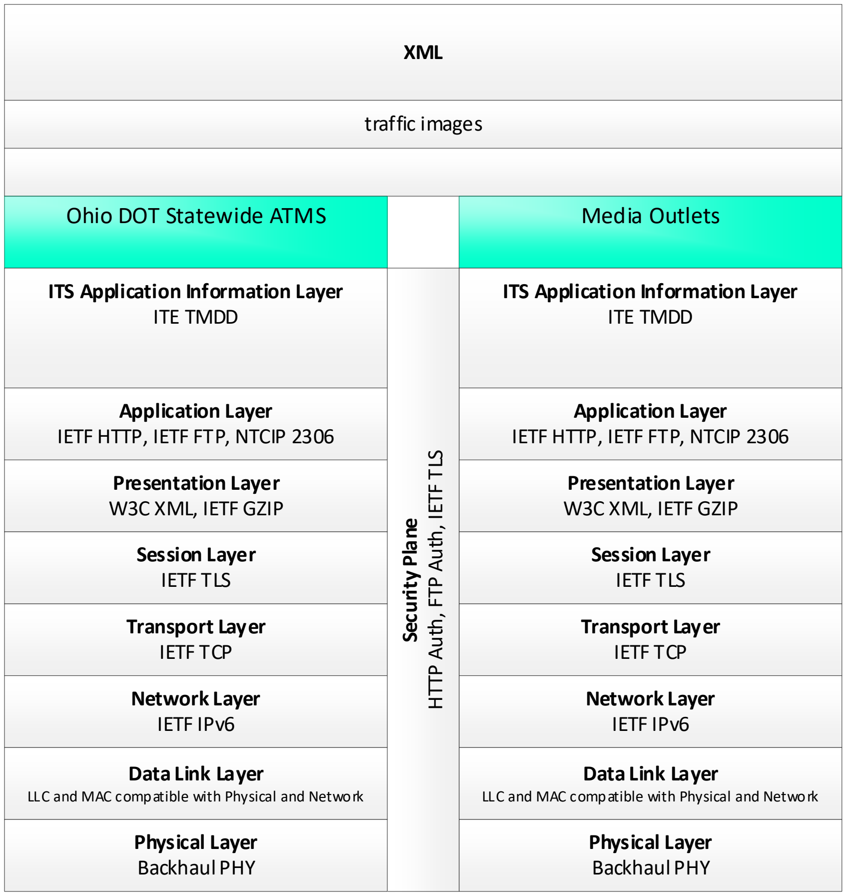
Figure 301 F: traffic images / S: Ohio DOT Statewide ATMS -> D: Private Traveler Information Systems / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a link to where the images may be found.

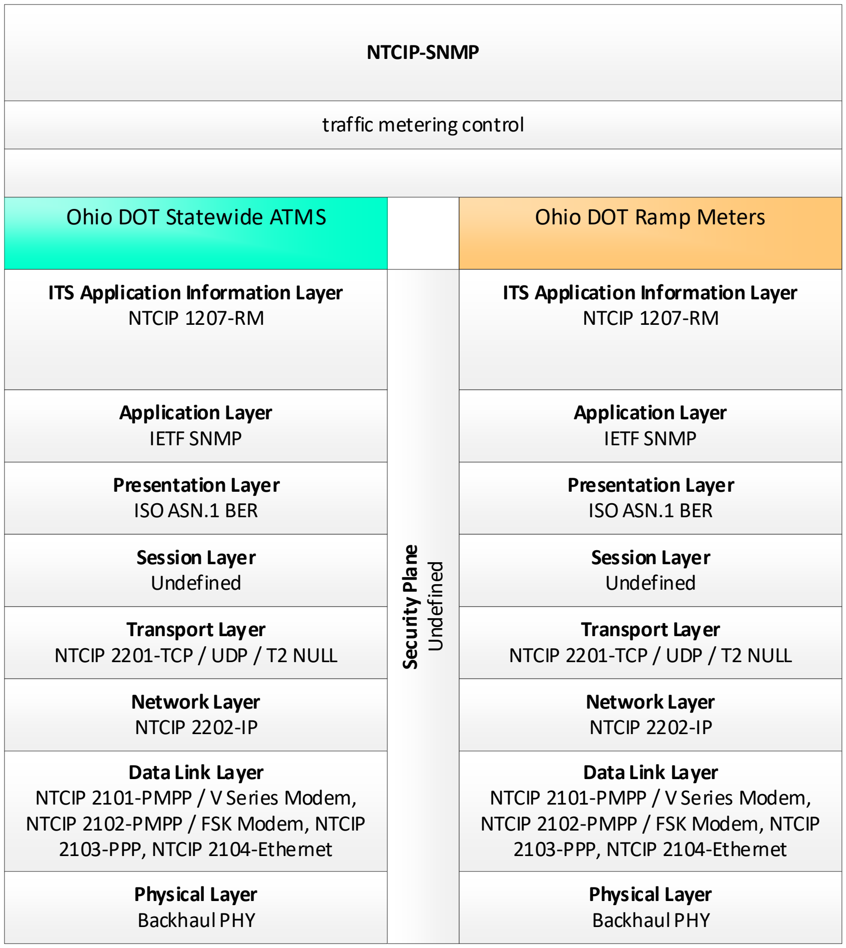
Figure 302 F: traffic images / S: Ohio Turnpike Central Dispatch -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

** Information Layer Standard(s) -- This is the metadata about the images and not the images themselves. Metadata may be pan/tilt/zoom, location of the camera, a

Figure 303 F: traffic information for media / S: Ohio DOT Statewide ATMS -> D: Media Outlets / P: XML



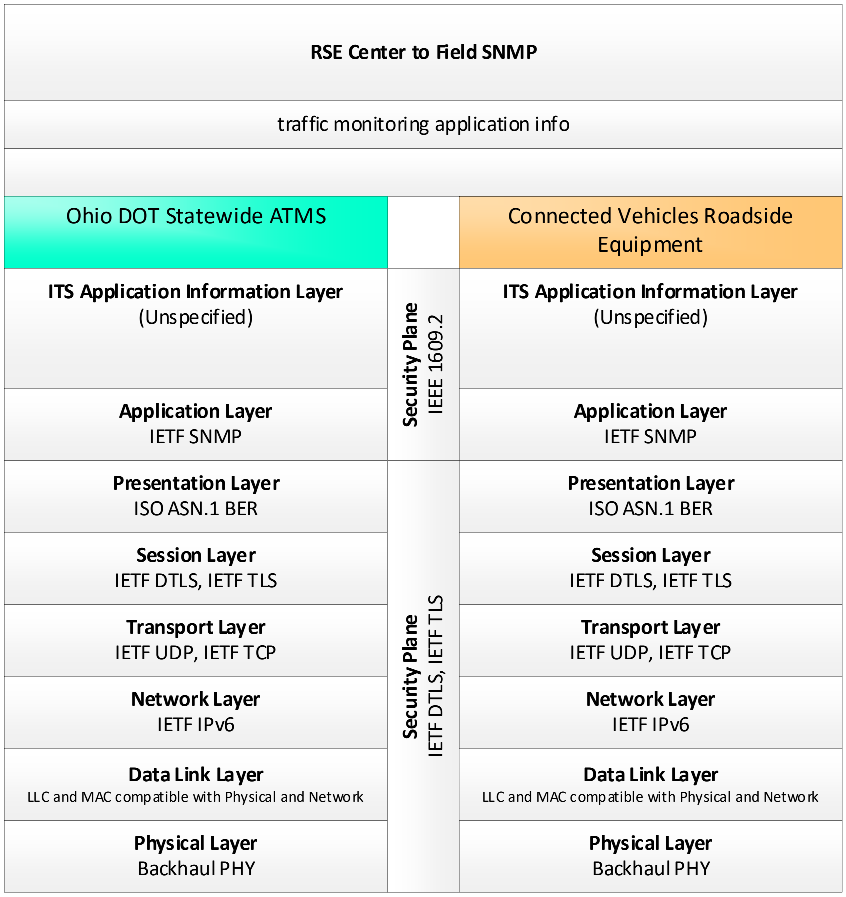
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 304 F: traffic metering control / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Ramp Meters / P: NTCIP-SNMP

NTCIP-SNMP		
traffic metering status		
Ohio DOT Ramp Meters		Ohio DOT Statewide ATMS
ITS Application Information Layer NTCIP 1207-RM	**Security Plane** Undefined	**ITS Application Information Layer** NTCIP 1207-RM
Application Layer IETF SNMP		**Application Layer** IETF SNMP
Presentation Layer ISO ASN.1 BER		**Presentation Layer** ISO ASN.1 BER
Session Layer Undefined		**Session Layer** Undefined
Transport Layer NTCIP 2201-TCP / UDP / T2 NULL		**Transport Layer** NTCIP 2201-TCP / UDP / T2 NULL
Network Layer NTCIP 2202-IP		**Network Layer** NTCIP 2202-IP
Data Link Layer NTCIP 2101-PMPP / V Series Modem, NTCIP 2102-PMPP / FSK Modem, NTCIP 2103-PPP, NTCIP 2104-Ethernet		**Data Link Layer** NTCIP 2101-PMPP / V Series Modem, NTCIP 2102-PMPP / FSK Modem, NTCIP 2103-PPP, NTCIP 2104-Ethernet
Physical Layer Backhaul PHY		**Physical Layer** Backhaul PHY

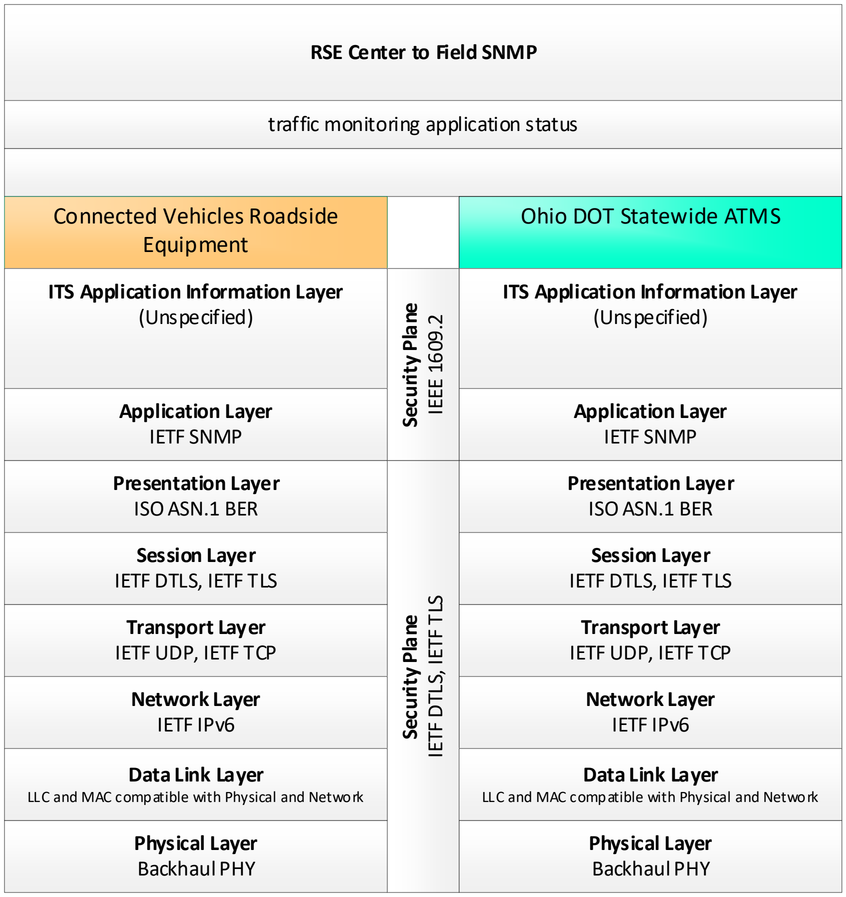
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 305 F: traffic metering status / S: Ohio DOT Ramp Meters -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP



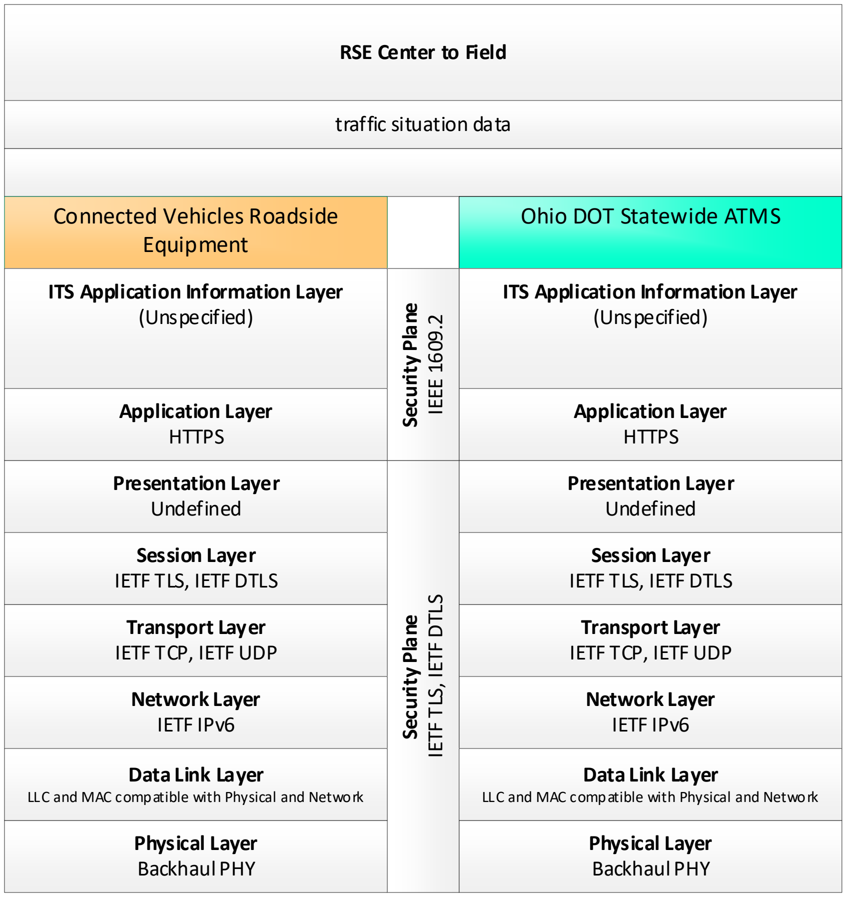
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 306 F: traffic monitoring application info / S: Ohio DOT Statewide ATMS -> D: Connected Vehicles Roadside Equipment / P: RSE-C2F-SNMP



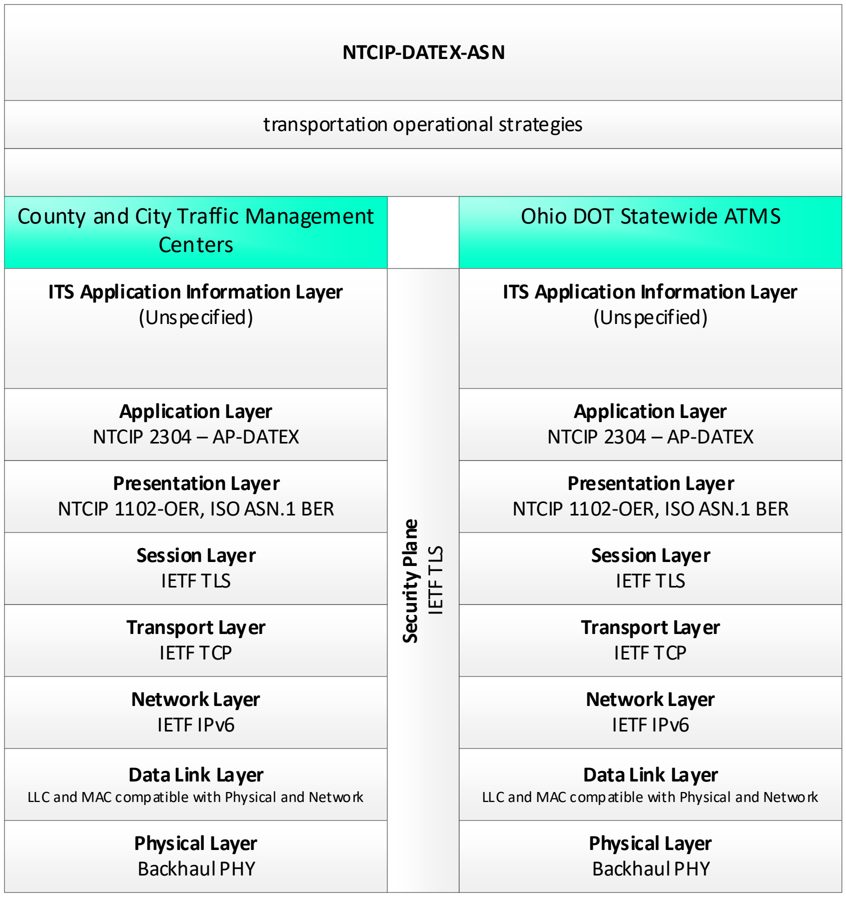
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 307 F: traffic monitoring application status / S: Connected Vehicles Roadside Equipment -> D: Ohio DOT Statewide ATMS / P: RSE-C2F-SNMP



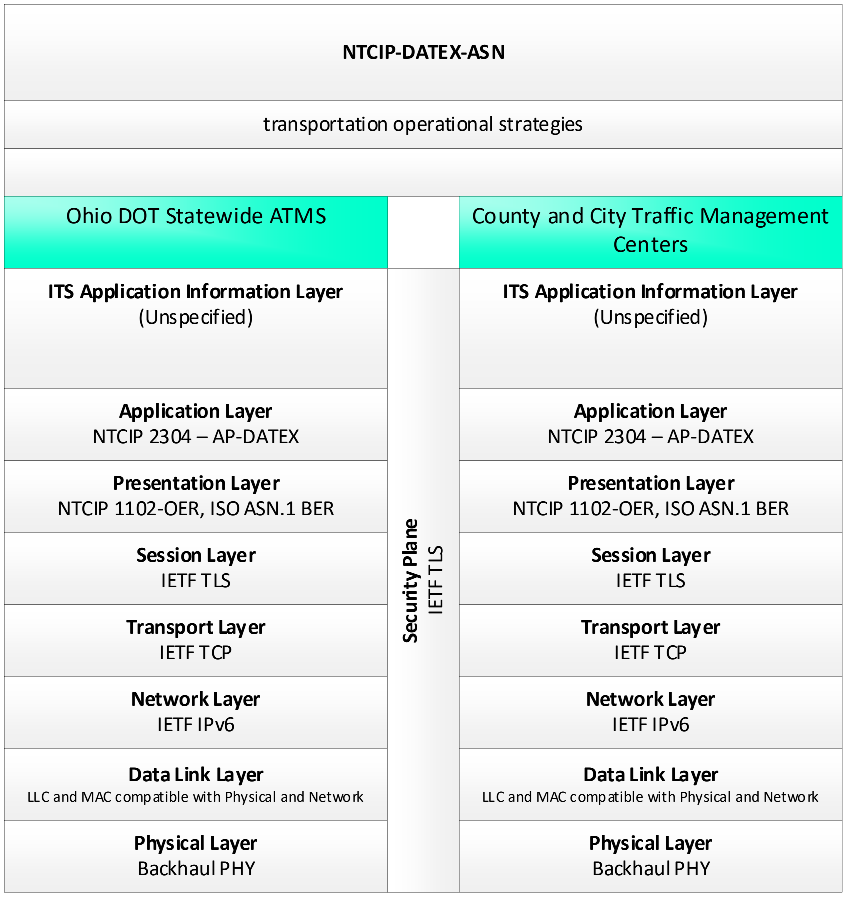
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 308 F: traffic situation data / S: Connected Vehicles Roadside Equipment -> D: Ohio DOT Statewide ATMS / P: RSE-C2F



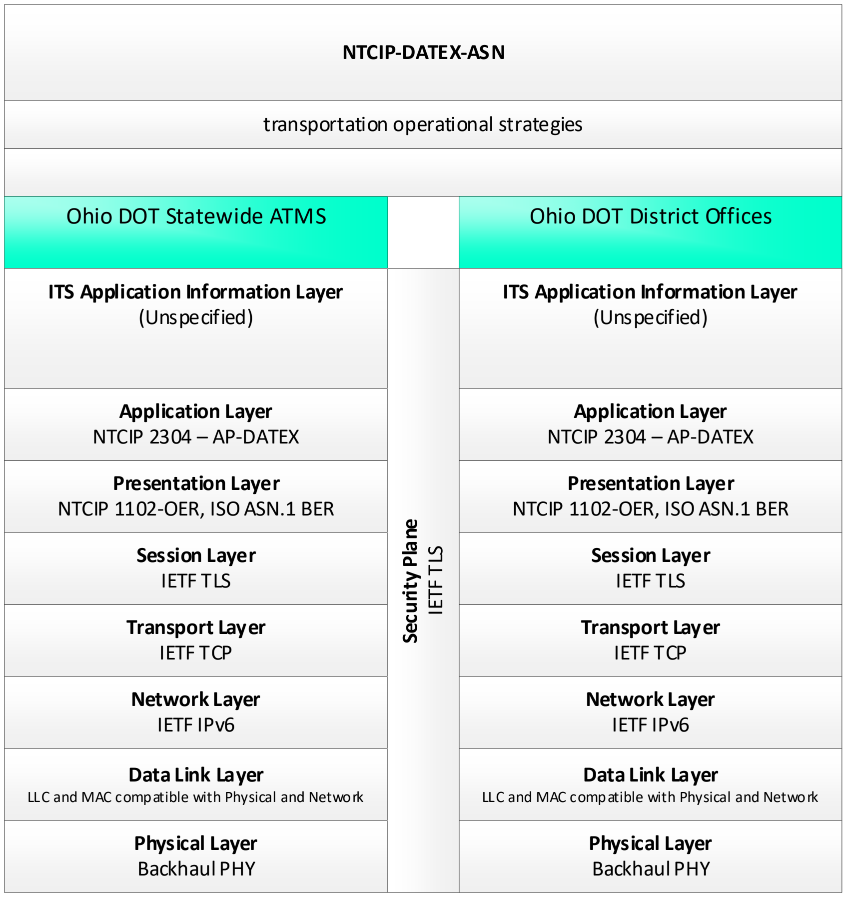
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 309 F: transportation operational strategies / S: County and City Traffic Management Centers -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



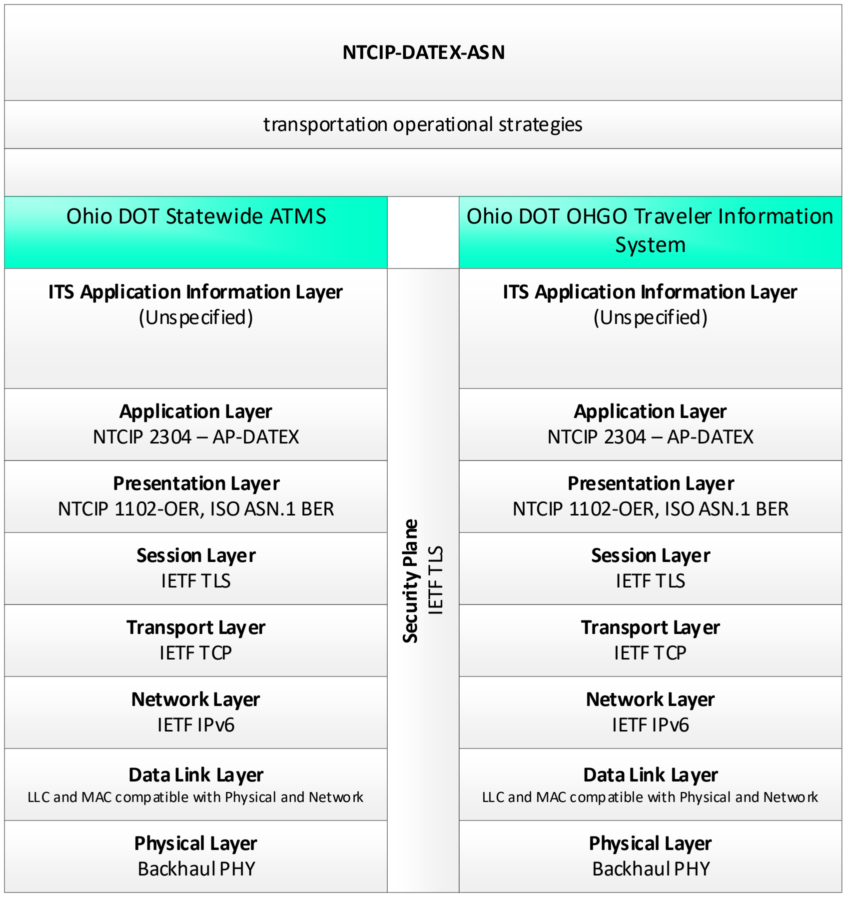
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 310 F: transportation operational strategies / S: Ohio DOT Statewide ATMS -> D: County and City Traffic Management Centers / P: NTCIP-DATEX



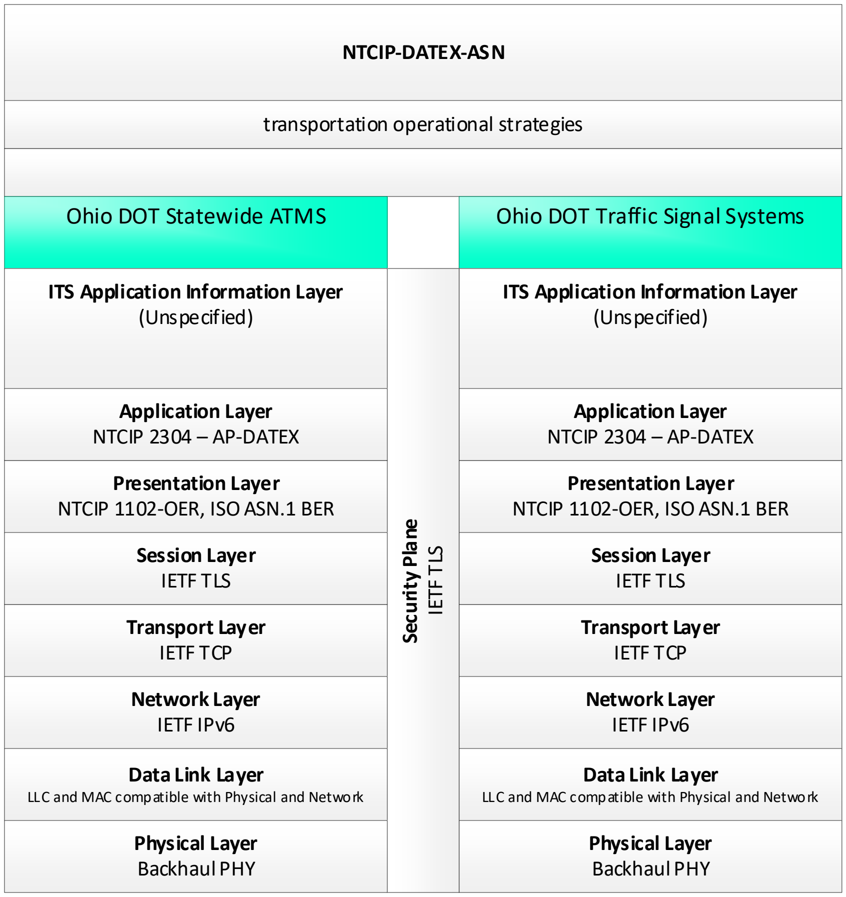
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 311 F: transportation operational strategies / S: Ohio DOT Statewide ATMS -> D: Ohio DOT District Offices / P: NTCIP-DATEX



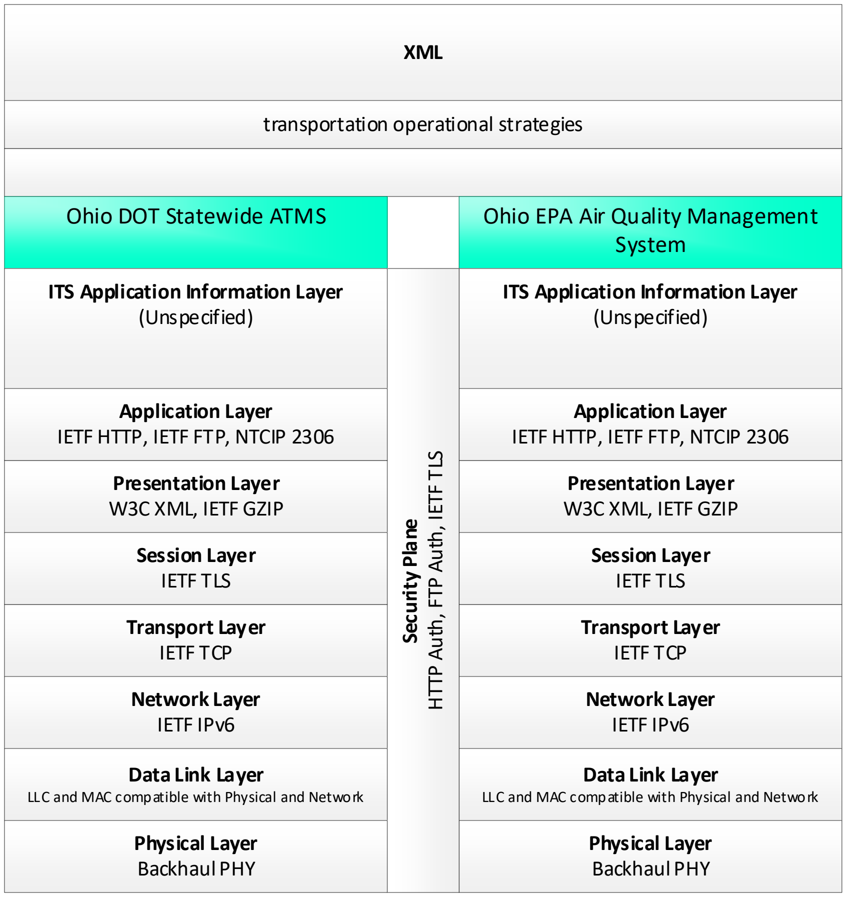
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 312 F: transportation operational strategies / S: Ohio DOT Statewide ATMS -> D: Ohio DOT OHGO Traveler Information System / P: NTCIP-DATEX



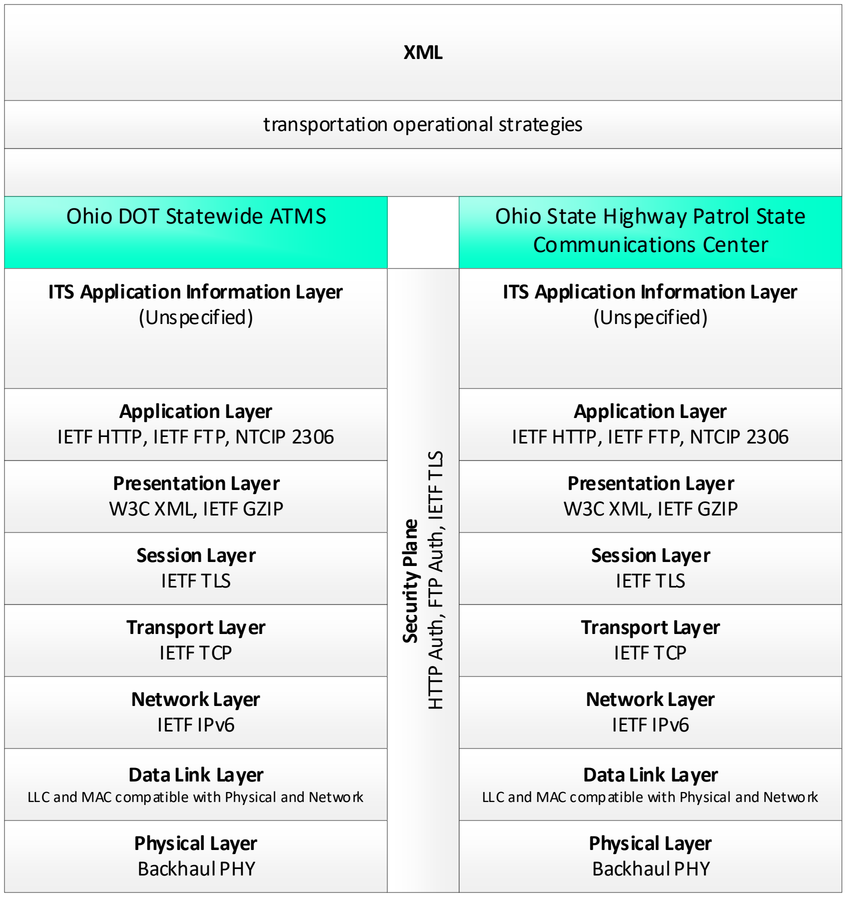
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 313 F: transportation operational strategies / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Traffic Signal Systems / P: NTCIP-DATEX



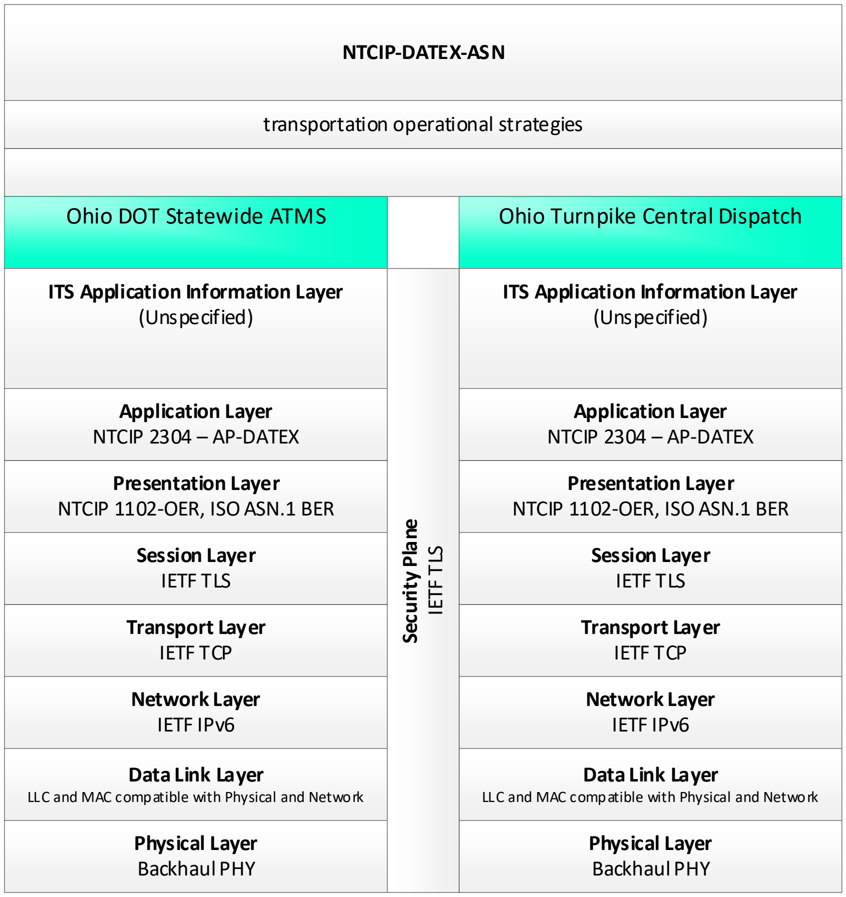
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 314 F: transportation operational strategies / S: Ohio DOT Statewide ATMS -> D: Ohio EPA Air Quality Management System / P: XML



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 315 F: transportation operational strategies / S: Ohio DOT Statewide ATMS -> D: Ohio State Highway Patrol State Communications Center / P: XML



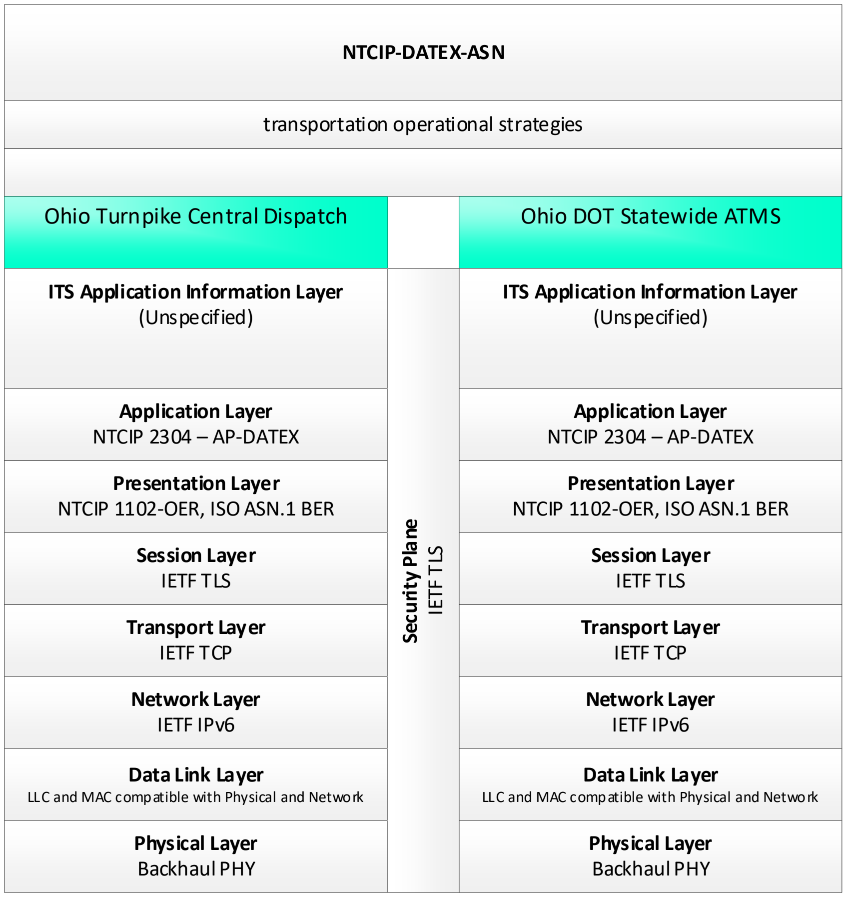
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 316 F: transportation operational strategies / S: Ohio DOT Statewide ATMS -> D: Ohio Turnpike Central Dispatch / P: NTCIP-DATEX

NTCIP-DATEX-ASN		
transportation operational strategies		
Ohio DOT Traffic Signal Systems		Ohio DOT Statewide ATMS
ITS Application Information Layer (Unspecified)	**Security Plane** IETF TLS	**ITS Application Information Layer** (Unspecified)
Application Layer NTCIP 2304 – AP-DATEX		**Application Layer** NTCIP 2304 – AP-DATEX
Presentation Layer NTCIP 1102-OER, ISO ASN.1 BER		**Presentation Layer** NTCIP 1102-OER, ISO ASN.1 BER
Session Layer IETF TLS		**Session Layer** IETF TLS
Transport Layer IETF TCP		**Transport Layer** IETF TCP
Network Layer IETF IPv6		**Network Layer** IETF IPv6
Data Link Layer LLC and MAC compatible with Physical and Network		**Data Link Layer** LLC and MAC compatible with Physical and Network
Physical Layer Backhaul PHY		**Physical Layer** Backhaul PHY

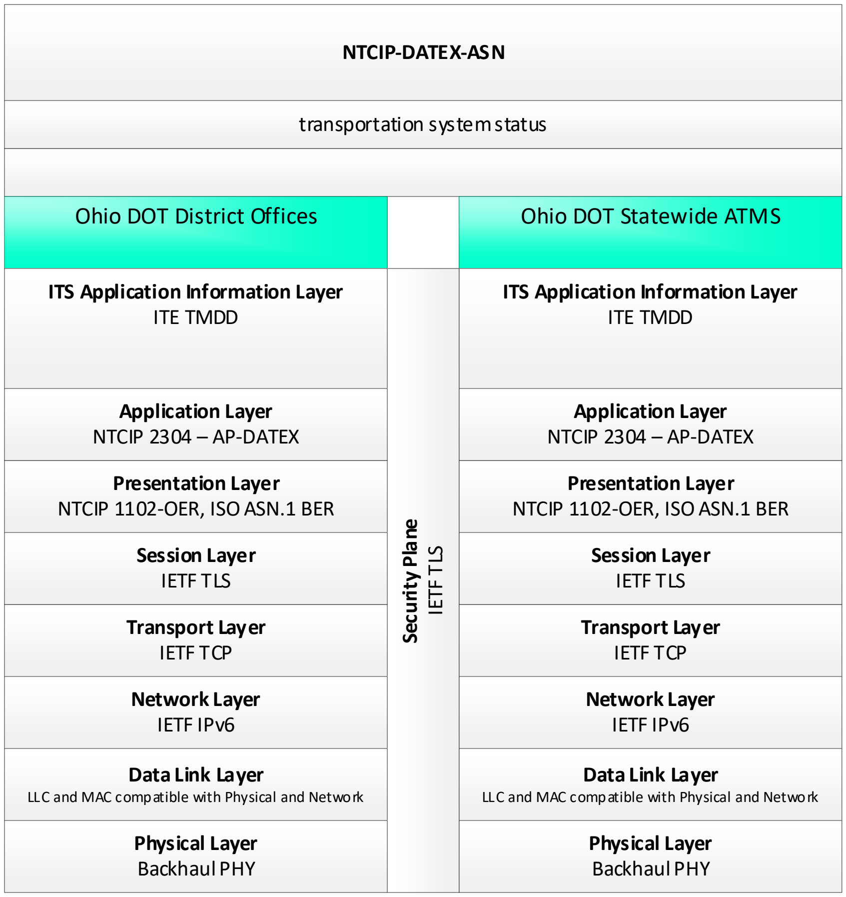
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 317 F: transportation operational strategies / S: Ohio DOT Traffic Signal Systems -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



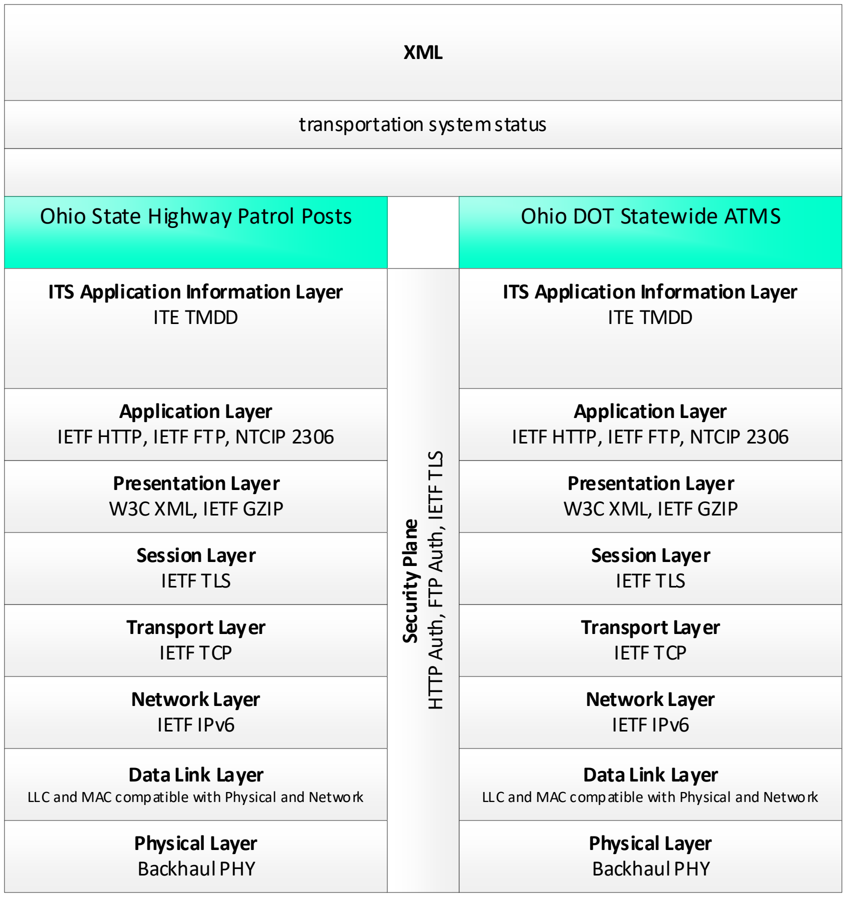
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 318 F: transportation operational strategies / S: Ohio Turnpike Central Dispatch -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



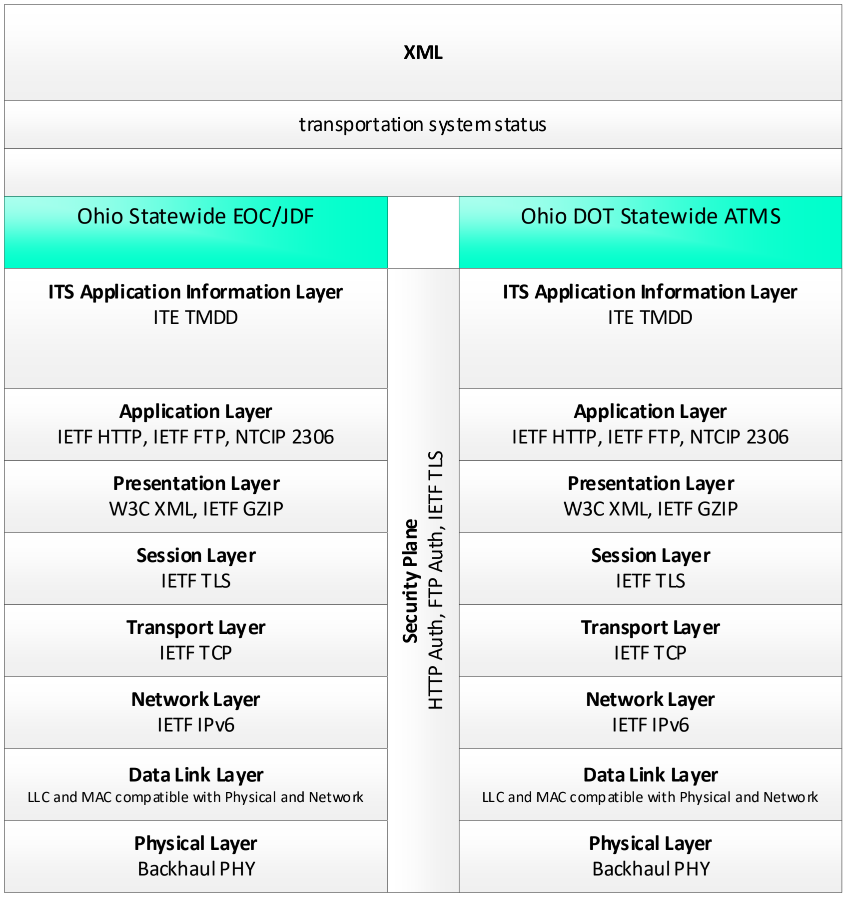
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 319 F: transportation system status / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



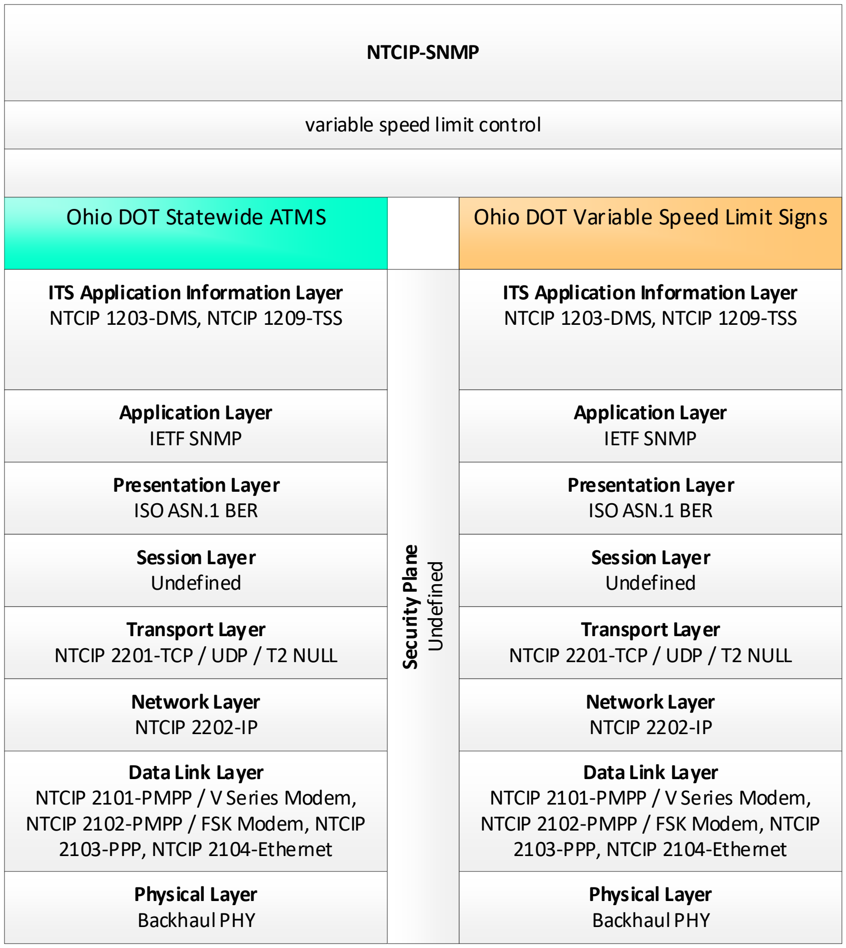
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 320 F: transportation system status / S: Ohio State Highway Patrol Posts -> D: Ohio DOT Statewide ATMS / P: XML



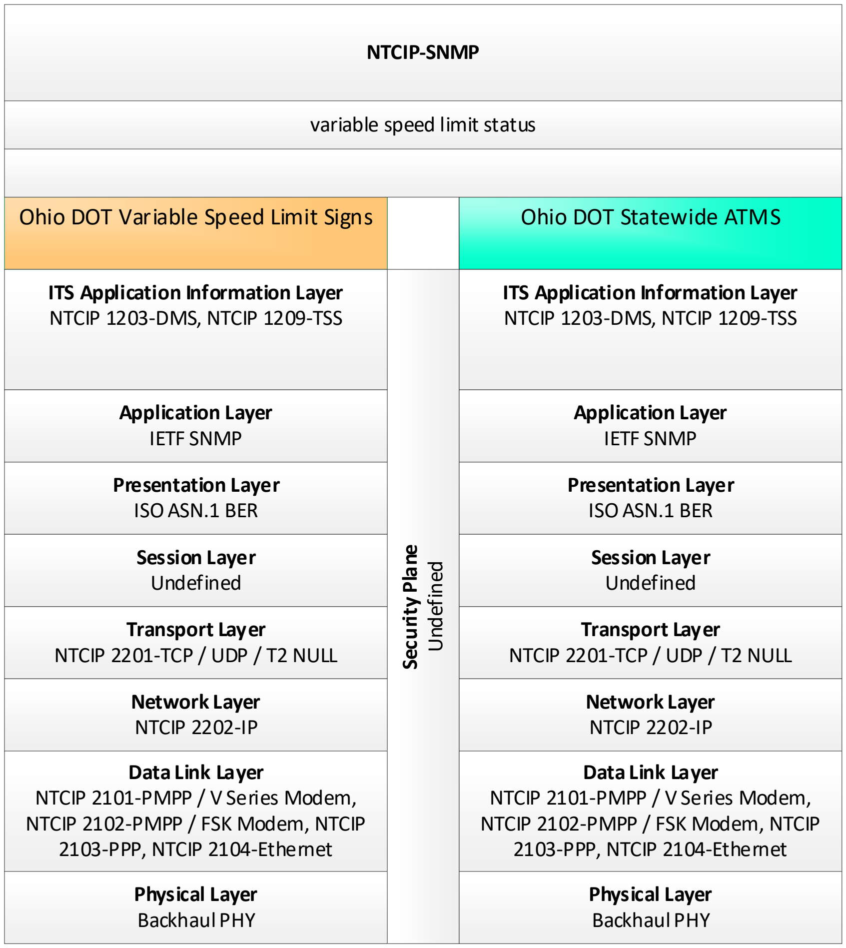
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 321 F: transportation system status / S: Ohio Statewide EOC/JDF -> D: Ohio DOT Statewide ATMS / P: XML



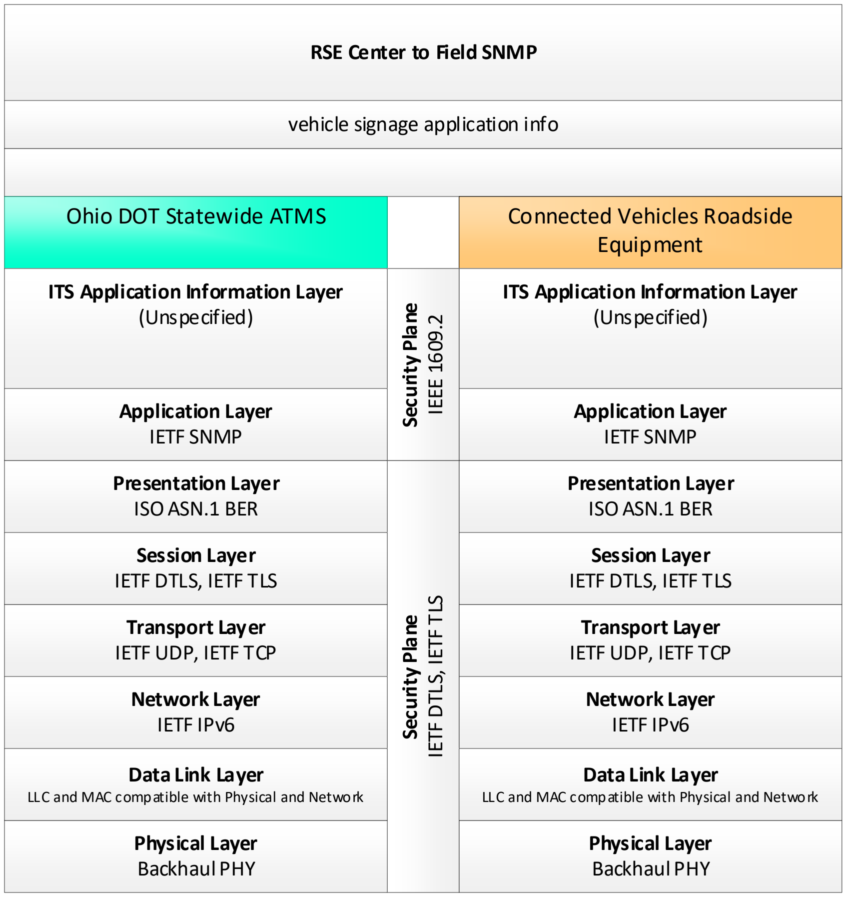
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 322 F: variable speed limit control / S: Ohio DOT Statewide ATMS -> D: Ohio DOT Variable Speed Limit Signs / P: NTCIP-SNMP



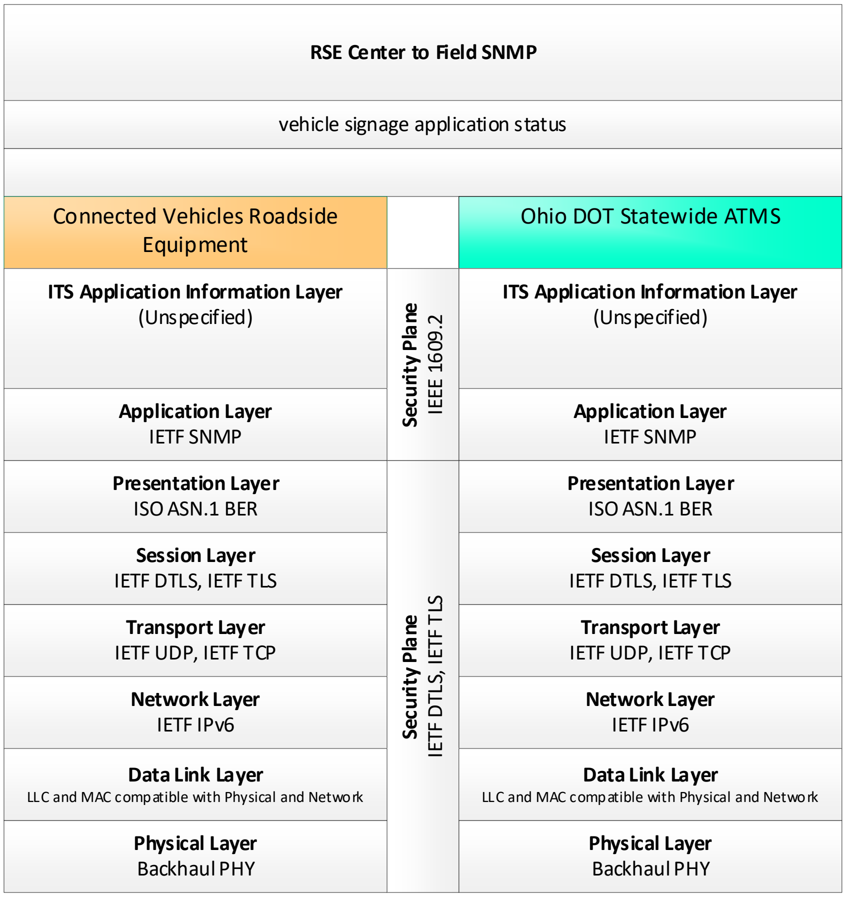
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 323 F: variable speed limit status / S: Ohio DOT Variable Speed Limit Signs -> D: Ohio DOT Statewide ATMS / P: NTCIP-SNMP



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 324 F: vehicle signage application info / S: Ohio DOT Statewide ATMS -> D: Connected Vehicles Roadside Equipment / P: RSE-C2F-SNMP



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between the center and field, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 325 F: vehicle signage application status / S: Connected Vehicles Roadside Equipment -> D: Ohio DOT Statewide ATMS / P: RSE-C2F-SNMP

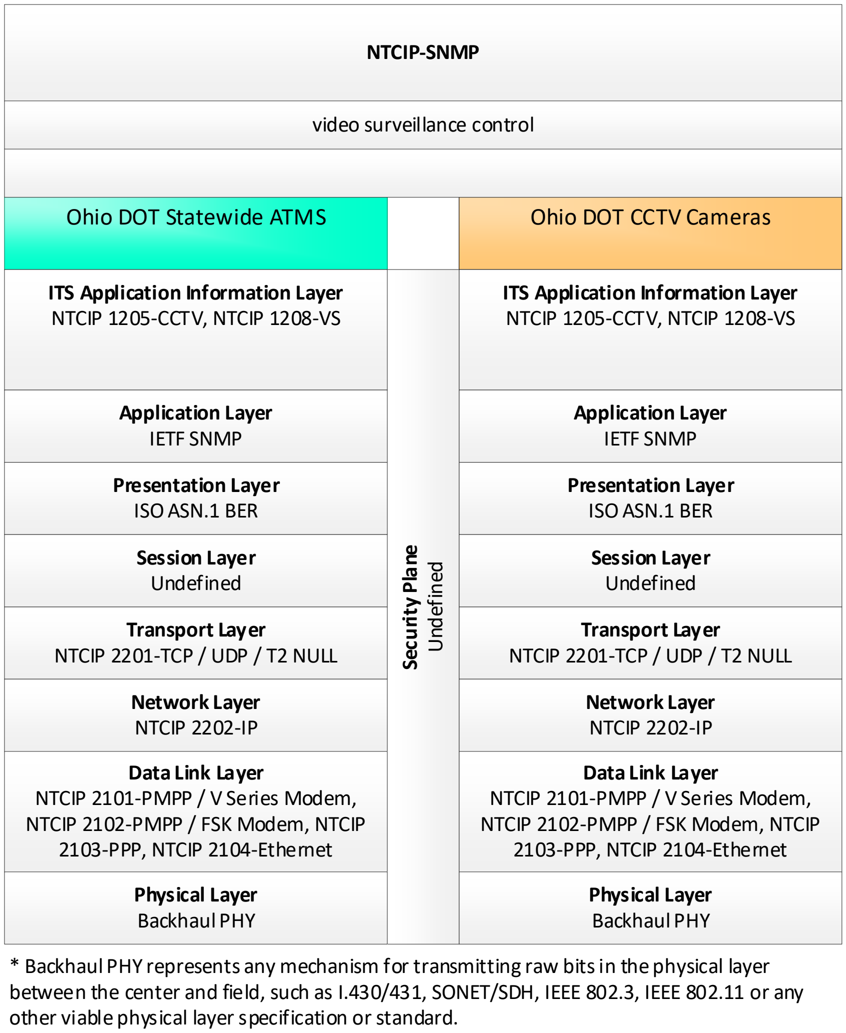
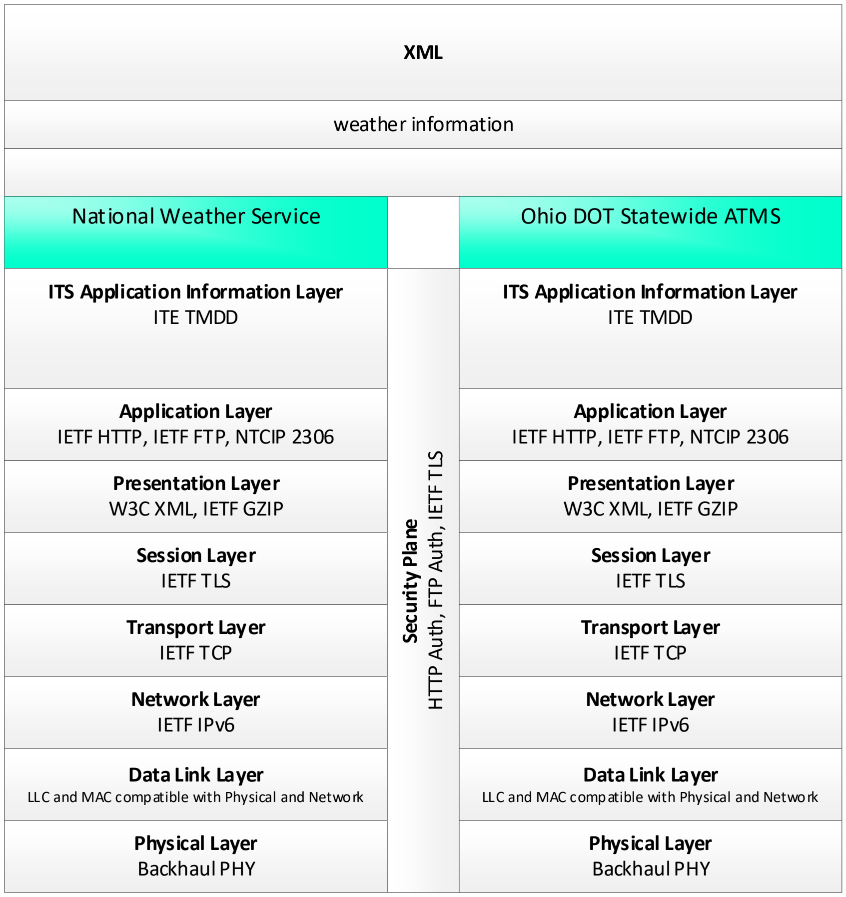
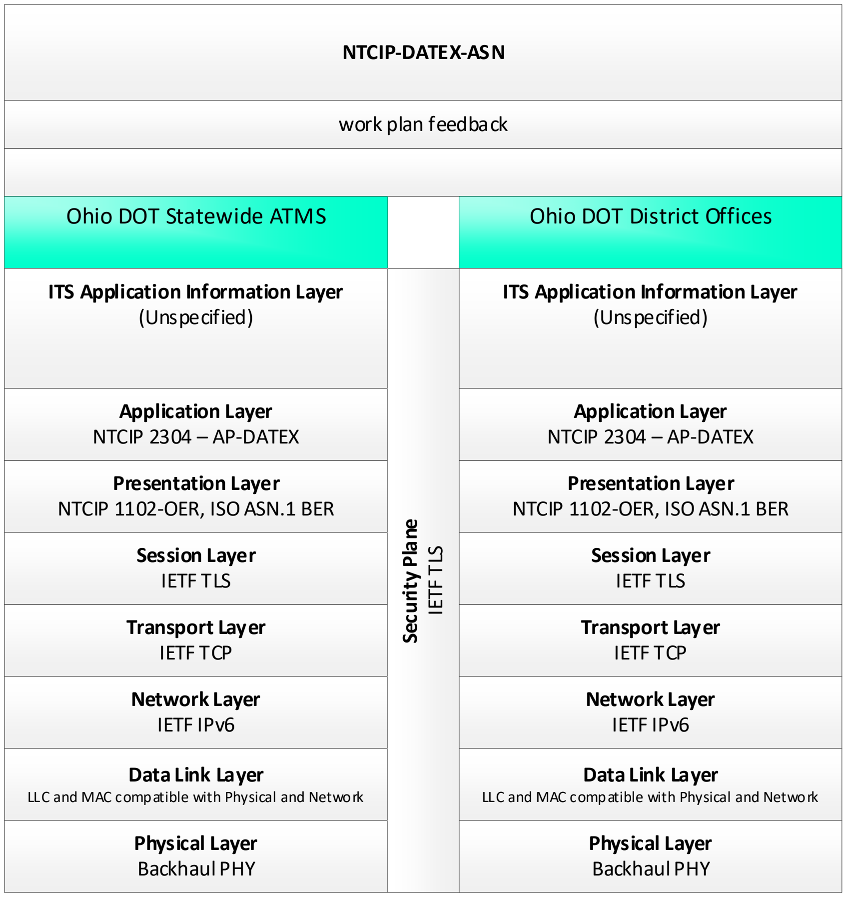


Figure 326 F: video surveillance control / S: Ohio DOT Statewide ATMS -> D: Ohio DOT CCTV Cameras / P: NTCIP-SNMP



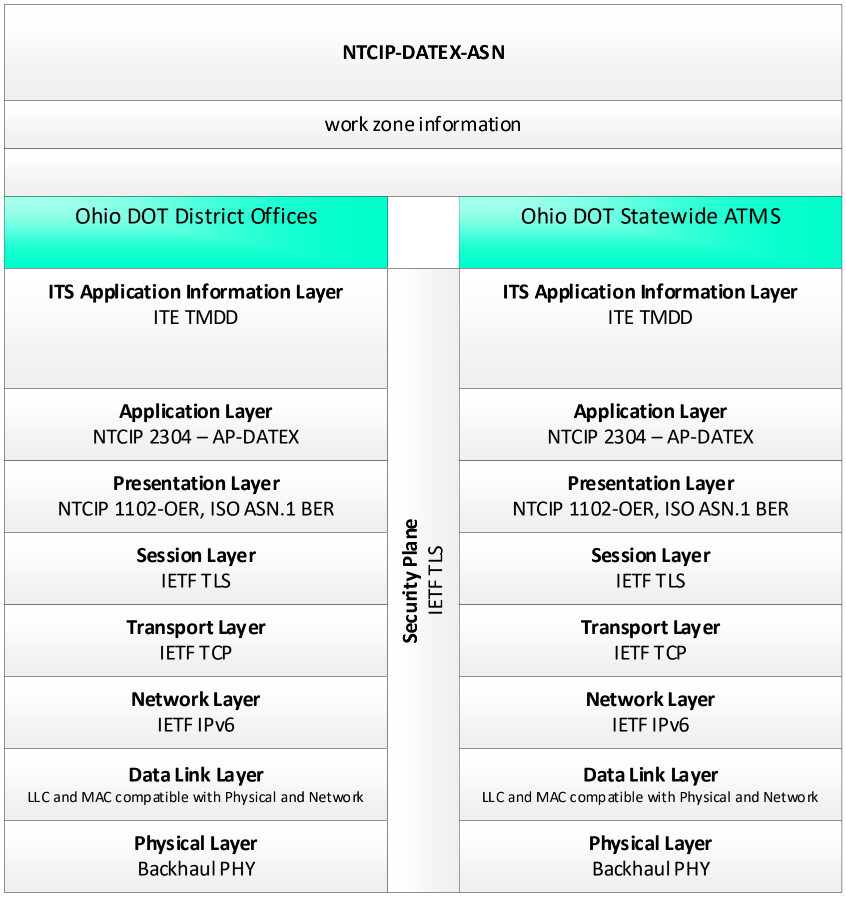
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 327 F: weather information / S: National Weather Service -> D: Ohio DOT Statewide ATMS / P: XML



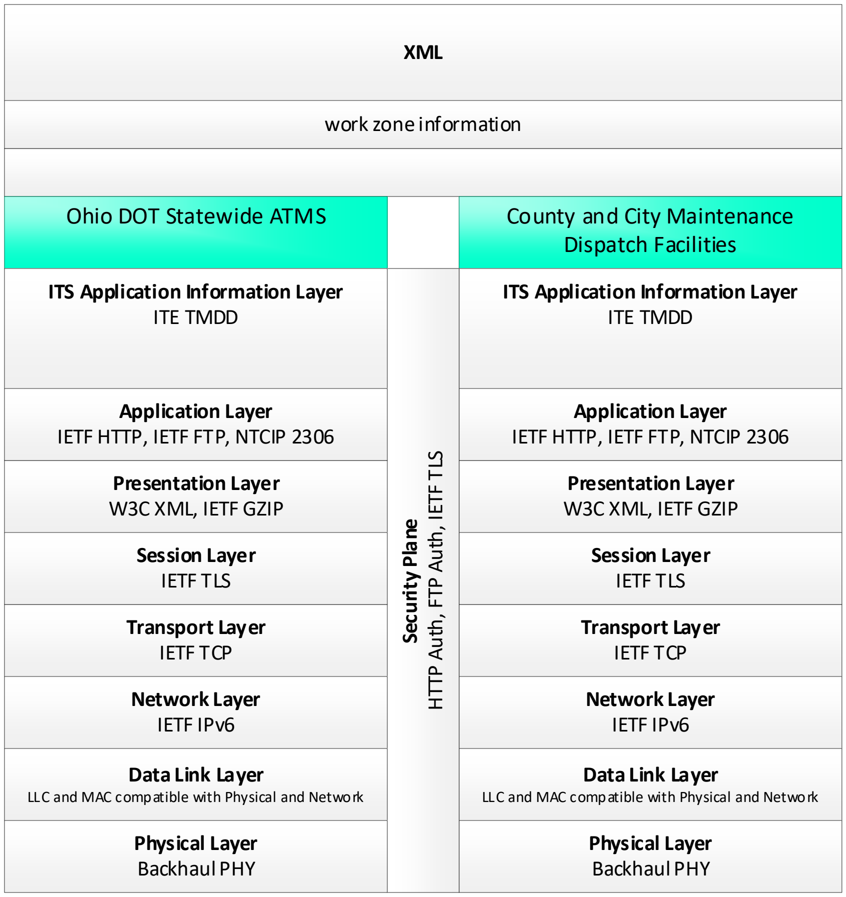
* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 328 F: work plan feedback / S: Ohio DOT Statewide ATMS -> D: Ohio DOT District Offices / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 329 F: work zone information / S: Ohio DOT District Offices -> D: Ohio DOT Statewide ATMS / P: NTCIP-DATEX



* Backhaul PHY represents any mechanism for transmitting raw bits in the physical layer between centers, such as I.430/431, SONET/SDH, IEEE 802.3, IEEE 802.11 or any other viable physical layer specification or standard.

Figure 330 F: work zone information / S: Ohio DOT Statewide ATMS -> D: County and City Maintenance Dispatch Facilities / P: XML