2.1.2   Ethernet Transport Service [C.2.1.2]

MetTel offers a fully compliant Carrier Grade Ethernet Transport Service (ETS) implemented over the MetTel core MPLS backbone. Ethernet links are transported using MPLS Label Switched Paths (LSPs) inside an outer MPLS tunnel. The MetTel core network is extended using network-to-network interfaces (NNI) to partner with providers to extend reach and provide

MetTel Ethernet Transport Flexible Options
• Carrier Grade Transport Service • Ethernet over MPLS core backbone • Extensive global reach with partner providers • Many options for access • Bandwidth on demand to meet operational requirements

connectivity options and alternative pricing approaches. With our extensive set of ETS last mile providers, MetTel exceeds the reach and connection options available on the network of any single provider. Using a combination of fiber, copper, cable, LECs and wireless provides the best opportunity to provide the most competitive price at any given location to meet service requirements.

2.1.2.1   Compliance with Evaluation Criteria [L.29.2.1]

The MetTel ETS solution fulfills the mandatory service requirements in SOW paragraph C.2.1.2. This section presents a technical description of our offering, demonstrating our capabilities in Standards, Connectivity, Technical Capabilities, Features, Performance Metrics, and Security. **Exhibit 2.1.2-1** highlights some key strengths and benefits of our ETS solution in relation to RFP Section M.2.1 evaluation criteria.

Exhibit 2.1.2-1. Features and Benefits of MetTel's Approach to ETS

Evaluation Criteria	Features and Benefits of MetTel's Approach
Understanding (M.2.1(1))	• ETS is a foundation service of MetTel's network and the preferred access method to the MetTel core network • Multi-network provider Ethernet NNI provides the widest choice of service and cost per geographic area • MEF 2.0 certified network partners • Eliminates the constraints of a single provider or single hardware vendor
Quality of Services (M.2.1(2))	• Full compliance with all SOW performance metrics including Availability, Latency, Jitter, Packet Loss, Packet Delivery, and Time-to-Restore • All KPIs available on the secure MetTel EIS Portal with current and historical reporting • 24x7 live customer support and service monitoring • ███████████████████████████████████████ ████████████████████
Service Coverage (M.2.1(3))	• MetTel ETS rides on a nationally distributed network, with integrated strategically

Evaluation Criteria	Features and Benefits of MetTel's Approach
	dispersed communications switches, switching centers, and dedicated network links to eliminate latency issues and service interruptions • Ethernet NNI partners that extend the reach to more areas than are available from any single provider network • ███████████████████████████████████████ ████████
Security (M.2.1(4))	• Privacy and security is compliant with IEEE 802.3 and supported as defined in an Agency Task Order • ETS is provided over the MPLS core using industry-standard telecommunications facilities and equipment. • MetTel's network architecture ensures that an Agency's traffic is properly identified, routed (redirected), scanned (via secure DHS EINSTEIN Enclaves), and delivered to the appropriate Agency's network. Our architecture also enables us to identify any traffic that has been inadvertently directed through the EINSTEIN Enclave and notify DHS. Metrics (SLA KPIs) are measured and reported in accordance with the EIS RFP. • MetTel supports the proper safeguards for handling traffic should failures occur with the DHS GFP. All DHS EINSTEIN Enclaves are housed within a planned ANSI/TIA-942 and ICD 705 certified facility.

2.1.2.1.1 Service and Functional Description [L.29.2.1, C.2.1.2.1, C.2.1.2.1.1]

MetTel provides cost-effective, global Ethernet Service to EIS customers. Our multi-network Ethernet NNI enables us to extend an Agency's Ethernet wherever required to meet mission needs and security requirements. With this approach, we have eliminated

Ethernet Transport Service MetTel Reach

• Multiple last-mile provider
• Many different access technology choices
• Cost-effective solution choices
• MEF 2.0 standards based Ethernet

many of the constraints of a single provider, single access provider, or single hardware vendor. We have the freedom to select the most cost-effective and/or most technically-appropriate solution based on the location, bandwidth, and survivability requirements. MetTel Ethernet will be provided as a dedicated service or a shared service.

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████████ Our service delivery platform is extended as necessary to the leading MEF 2.0 certified vendors to expand our Ethernet Service to a large footprint ████████

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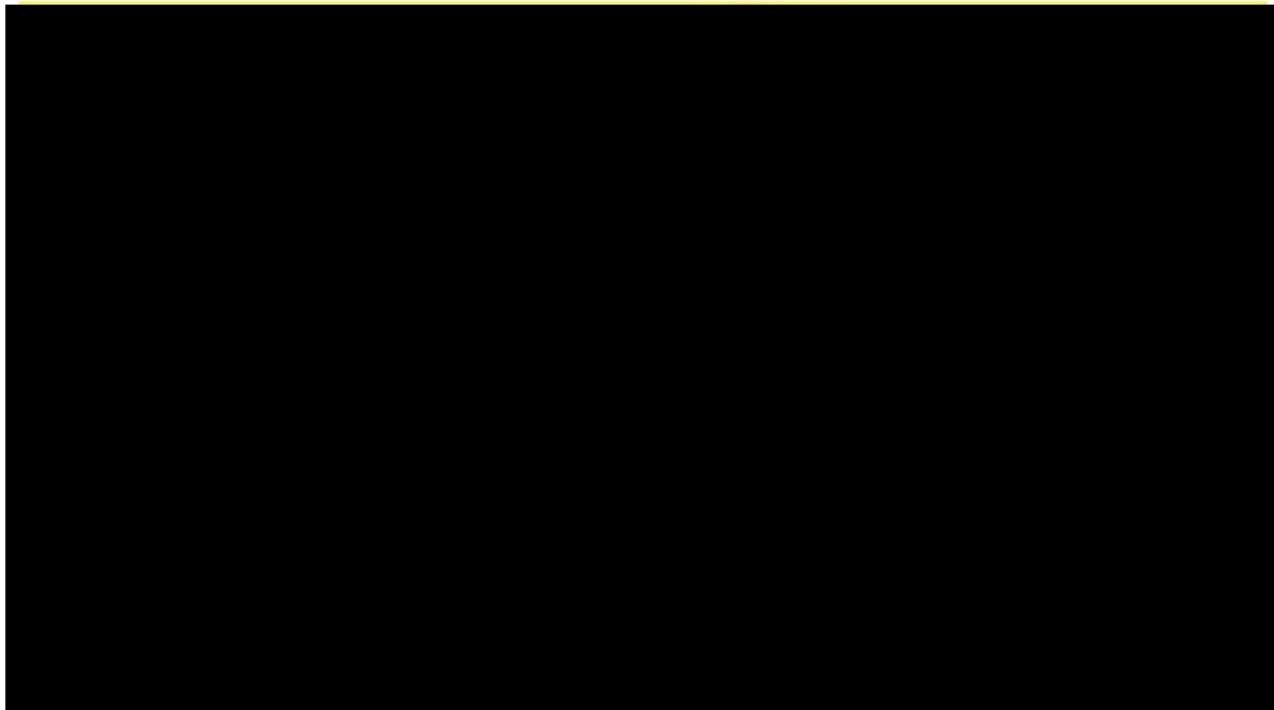
Exhibit 2.1.2-2. Ethernet Service Architecture

Exhibit 2.1.2-2 shows our layered network architecture that provides global reach and service conformance. Our vendor arrangement with MEF CE 2.0 certified carriers provides unparalleled reach and capacity worldwide. The MetTel ETS provides a seamless end-to-end service from the SDP with the appropriate SRE, across the most direct network connection. This includes Metro access, Metro Core, Long Haul, or the extended MetTel backbone using the best choice Multi-Network Ethernet NNI. MetTel's approach is standards-based and does not require protocol conversion. If protocol conversion is required, we will specify the performance impact of delivering the service end-to-end.

We provide ETS over partner SONET networks and the extended MPLS backbone described above. Ethernet Services provide point-to-point, rooted multipoint, and multipoint-to-multipoint (fully meshed) connections. Ethernet provides a cost-effective, flexible, and robust connection that supports a combination of features that enable the transport of data with minimal protocol translation while supporting CoS and QoS across the network. We provide the following Ethernet services as defined by the MEF CE 2.0 and associated standards.

Ethernet Private Line (E-Line). E-Line is a point-to-point service that connects Agency sites with reserved bandwidth for mission-critical applications. MetTel implements E-Line service using our MPLS core and the Ethernet NNI. The Ethernet NNI provides industry-standard Ethernet extensions with vast global reach and connectivity. We provide connectivity across the MAN or WAN. E-Line supports full port speeds (10 MB, 100 MB, 1 GB, and 10/40/100 Gbps or higher Gbps) ports as they are available by location (i.e. CBSA). E-Line supports different QoS priorities for customer traffic and meets the KPIs specified in C.2.1.2.4. We deliver E-Line services in the most economical means using the best partner NNI or our MPLS backbone. **Exhibit 2.1.2-3** shows the connection of on-net and off-net sites with E-Line.
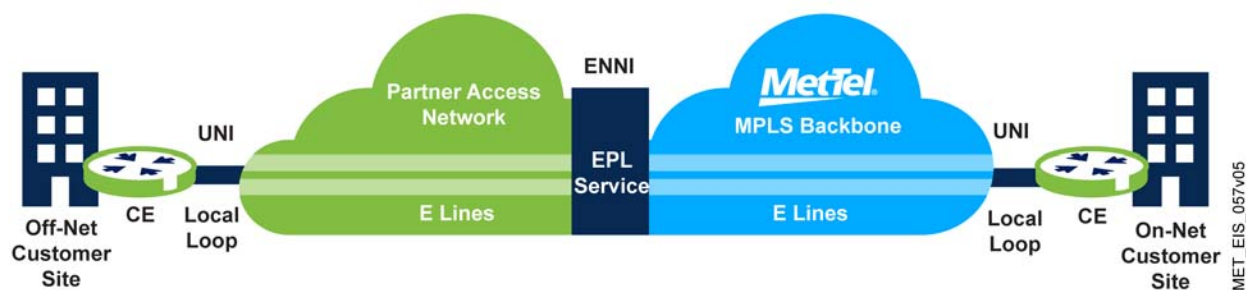
Exhibit 2.1.2-3. E-Line Extended Delivery Model

Ethernet Private LAN (E-LAN). Our E-LAN service supports both point-to-multipoint and fully meshed configurations. For point-to-multipoint service, E-LAN connects three or more sites over Layer 2 tunnels across MetTel or partner MPLS networks. We support ports of 10 Mbps, 100 Mbps, 1 Gbps, and 10/40/100 or higher Gbps as available by location (i.e. CBSAs), and QoS is supported for prioritizing customer traffic. For fully meshed configurations, E-LAN connects one or more roots and a set of leaves but to ensure confidentiality of agency traffic will deny inter-leaf communications. Multiple sites can be configured as the root site, and other sites can communicate with each other through multiple root sites. Thus Agencies connect disparate LAN segments into a single Agency-wide or inter-Agency virtual LAN that can span a MAN and/or a WAN. **Exhibit 2.1.2-4** shows the connection of on-net and off-net sites with E-LAN.

Use or disclosure of data contained on this page is subject to the restrictions on the title page of this proposal.
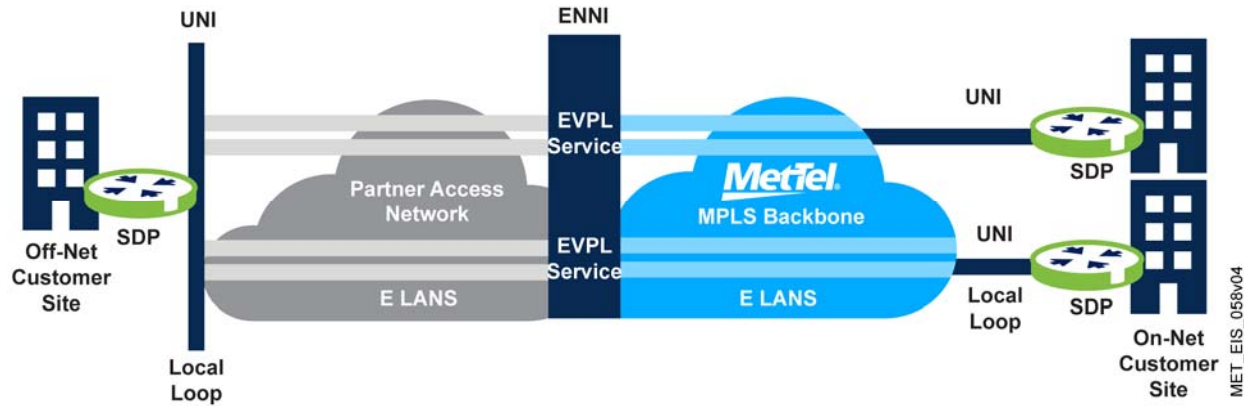
Exhibit 2.1.2-4. E-LAN Extended Delivery Model

Our ETS is engineered, monitored, and managed end-to-end to ensure compliance with all requirements specified in the specific Agency Task Order. We provide the capacity and bandwidth to transport the Government's information and conform to the Metro Ethernet Forum MEF CE 2.0, IETF RFC 3069, ITU standards for Network Architecture, Services, Operations and Maintenance (O&M), Protection, Equipment, and Equipment Management and Terminology. We also conform to IEEE Standards and Acceptance Testing of Ethernet Service as defined in C.2.1.2.1.2 of the EIS RFP. We support new versions as other standards evolve or these are updated.

2.1.2.1.2   Standards [L.29.2.1, C.2.1.2.1.2]

Carrier Ethernet (CE) 2.0 provides a global standard for service providers to interconnect more quickly and meet the growing needs for Carrier Ethernet services at locations not on a service provider's own network. Such locations are referred to as off-net. This standard provides the mechanism and standard interface to our Multi-Network Ethernet NNI. Exhibits 2.1.2-2 and 2.1.2-3 show the approach to providing both E-Line and E-LAN.

Our partners are the leaders in Ethernet delivery and Ethernet standards development. **Exhibit 2.1.2-5** is a partial list of our partner providers and their current MEF certification. Most of our partners are MEF CE 2.0 certified, a strength in our delivery of standards-compliant ETS. We deliver Ethernet services compliant with all the standards defined in C.2.1.2.1.2. ███████████████████████████████████████

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Exhibit 2.1.2-5. MetTel Ethernet Partner Service Providers

Source: www.mef.net/certification/services-certification-registry November 30, 2015

2.1.2.1.3 Connectivity [L.29.2.1, C.2.1.2.1.3]

Our ETS provides connectivity and interoperates with:

1. Intra-agency LAN-LAN Connectivity. Ethernet Service provides connectivity for LAN implementations located in the same or different metropolitan areas. This enables the Agency to extend the LAN to the MAN or WAN by connecting the Agency's SDP(s) in one location to another SDP(s) in one or more locations. Interconnections are possible over transoceanic links if required.

2. Inter-agency LAN-LAN Connectivity. When different Agencies share resources to connect to the contractor's metro or long-haul network, we connect one Agency's SDP(s) to the other Agency's SDP(s).

2.1.2.1.4 Technical Capabilities [L.29.2.1, C.2.1.2.1.4]

The MetTel architecture allows Agencies to interconnect their LANs transparently over MAN and WAN regardless of the geographic diversity of their sites. **Exhibit 2.1.2-6** defines our response to all ETS technical capabilities in the EIS RFP.

Exhibit 2.1.2-6. Ethernet Transport Service Technical Capabilities

C.2.1.2.1.4 Reference	Feature	MetTel Response
1	Routing Requirements (C.1.8.8)	MetTel's network architecture and security partner Raytheon, ensures that Agency traffic is properly identified, routed (redirected), scanned and monitored (via EINSTEIN enclaves), and delivered to the appropriate Agency network. Our architecture also enables us to identify any traffic that has been inadvertently directed though the DHS EINSTEIN enclave and notify DHS. Metrics (SLA KPIs) are measured in accordance with the EIS RFP.

C.2.1.2.1.4 Reference	Feature	MetTel Response
		MetTel team supports the proper safeguards for handling traffic should failures occur with the DHS GFP. Additionally, all DHS EINSTEIN enclaves are housed within a planned ANSI/TIA-942 and ICD 705 certified facility.
2	Geographic Coverage	The MetTel architecture provides Agencies a seamless end-to-end service from the SDP SRE (CPE) over Metro Access, MetTel core MPLS network and across NNIs which minimizes conversions of protocols. If protocol conversions are required, MetTel identifies how they will impact service delivery. MetTel provides Ethernet connections (Intra-city ETS) to Agency sites located in the same city in the continental U.S. (CONUS) and outside the continental U.S. (OCONUS). ETS provides connections at both domestic and non-domestic locations.
3	Support Layer 2 and 3 Clients	MetTel's Ethernet service is delivered via a User-to-Network-Interface (UNI) at the Agency SDP and supports Layer 2 (i.e. Switches) and Layer 3 clients (i.e. Routers); this includes Agency clients that support Layer 3 protocols such as IPv4 and IPv6.
4	Ethernet Virtual Connections (EVC)	MetTel's ETS operates over EVCs, which provides the association of two or more UNIs.
5	ETS Delivery	MetTel delivers ETS service to an Agency SDP via a UNI.
6	Circuit Emulation	Should it be required, MetTel will support circuit emulation services for TDM transport.
7	EVC Support	MetTel supports point-to-point, multipoint-to-multipoint, and Rooted multipoint EVCs.
8	EVC Multiplexing	MetTel supports EVC multiplexing
9	Rate Limited Throughput Access Links	MetTel supports rate-limited throughput access links. For example, a 100 Mbps port can be limited to 40 Mbps, or a 1 Gbps port can be limited to 200 Mbps. Increments for rate limiting are 1 Mbps on a 10 Mbps port, 10 Mbps on a 100 Mbps port, and 100 Mbps for a 1 Gbps port.
10	Rate Limiting at SDP	MetTel supports rate limiting at the Agency SDP and at the individual VLAN ingress and egress.
11	Privacy and Security	MetTel supports security as defined in IEEE 802.3 as defined in the Task Order.
12	Physical Interfaces	MetTel supports the physical interfaces defined in C.2.1.2.3 for all the mandatory interfaces as descr bed in Section 2.1.2.6.
13	Traffic Profiles	MetTel supports the following traffic profiles, called Bandwidth Profiles by the MEF: Committed Information Rate (CIR) Committed Burst Size (CBS) Peak Information Rate (PIR) MBS – Often called the burst information rate and is equal to the maximum information rate at which bursts can be sent.
14	Performance Metrics	See Section 2.1.2.1.7
15	Service Frame Delivery	MetTel provides Service Frame Delivery options that include Unicast Frame Delivery, Multicast Frame Delivery (RFC 4604), and Broadcast Frame Delivery (IEEE 802.3)
16	VLAN Tag Support	MetTel provides support for Virtual LAN (VLAN) tags for preservation, translation, and stacking, defined in IEEE 802.1Q.
17	Service Multiplexing	MetTel supports multiple EVCs connected via a single UNI.
18	Bundling	MetTel supports bundling to enable two or more VLAN IDs to be mapped into a single EVC at a UNI.

C.2.1.2.1.4 Reference	Feature	MetTel Response
19	Security Filters	MetTel supports security filters as defined by an Agency Task Order. Notification of triggered filters are sent to the SOC.
20	Performance Monitoring	████████████████████████████████████ ██ ██ ██████████████████████████████████ ████████
21	Maintenance Functions	MetTel has a full set of network maintenance functions defined by the MPLS-TP O&M standards efforts and supports EIS maintenance. These include: Alarm Suppression: the ability to turn off an alarm to enable problem or transmission analysis. Loopbacks: primarily a means of testing the transmission infrastructure. Can be accomplished in intrusive or non-intrusive (transparent to on-going connections) mode. Protection switching and restoration, ████████████████ ██ ████████████████████████████████████ ██ ████████
22	Network Topologies	MetTel supports the implementation of point-to-point, rooted multipoint, and multipoint-to-multipoint (mesh) network topologies.
23	Geographical Diversity	MetTel provides geographically diverse connections to provide added reliability. Agencies can buy geographically diverse routes from MetTel or a different provider to serve as a protection path. MetTel provides both paths to ensure geographical diversity as a partner provider and provides the second path and connect through the ENNI. Refer to Access Arrangements in Section 2.1.5 for a full description of diversity options.
24	Bridging	MetTel supports bridging, which is the connection of a LAN to another LAN that uses the same protocol; in the EIS case, this is Ethernet. IEEE 802.1X-REV is a revision of the IEEE 802.1X standard that contains security encryption and secure key exchange, allowing secure communication between authenticated and authorized devices. The 802.1X-REV feature includes the 802.1AE MAC Security (MACSec) encryption as well as 802.1af, MACSec Key Agreement (MKA) protocol.
25	Virtual Connection Sizes	MetTel supports Virtual Connection sizes for point-to-point and multipoint-to-multipoint Ethernet connections up to 40 Gbps.
26	Quality of Service (QoS)	MetTel provides QoS and traffic prioritization that enables higher priority traffic to be transmitted first. The MetTel network accommodates and optimizes an Agency's applications to ensure accurate and consistent prioritization of traffic across the network.
27	Traffic Reconfiguration	MetTel Customer Support is flex ble and able to modify a specific service connection after the connection is established. Changes to an established connection may include an upgrade or downgrade of speeds that do not result in physical equipment changes.

2.1.2.1.5   Features [L.29.2.1, C.2.1.2.2]

Reserved

2.1.2.1.6   Interfaces [L.29.2.1, C.2.1.2.3]

We provide UNI Types 1, 2, 14, and 15 as required by EIS RFP Section C.2.1.2.3.

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2.1.2.1.7   Performance Metrics [L.29.2.1, C.2.1.2.4]

Our embedded performance collection and management capabilities provide real-time and historic reporting of the AQL of KPIs for the ETS. ████████████████████

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██ The Trouble Ticketing element of the MetTel Portal maintains and reports time-to-restore which is also used by the SOC for correlation and analysis of events.