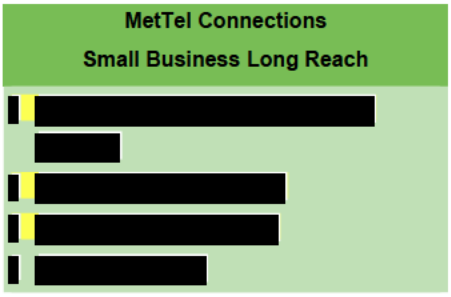
### 2.1.5 Access Arrangements [C.2.9, F.2.1 (28)]




Access Arrangement (AA) is a key part of the MetTel standard delivery model, and we stand ready to provide the best choice in AA to meet the diverse needs of Agency users. We built our business as a true telecommunications integrator providing the best solution with the best price. We have multiple AA providers in most CBSA and use this competitive edge to offer the most cost-effective, reliable solution for the Government. We have wholesale partnerships with most of the Local Exchange Carriers (LECs), Tier-1 carriers and ISPs, and cable and wireless providers. Through these partnerships, we provide the right technology complete with customized access, required diversity, and path avoidance. With this approach, we have eliminated the constraints of a single provider, single access provider, or single hardware vendor. We have the freedom to select the most cost-effective, best technological access solution based on the location, bandwidth, and survivability requirements.

AAs provide connections between the Agency SDP and the network POP. We provide customized AAs that provide enhanced diversity and survivability. Several examples of customized AAs follow.

#### *2.1.5.1 Compliance with Evaluation Criteria [L.29.2.1]*

The MetTel AAs fulfill the mandatory service requirements contained in C.2.9. This section presents a technical description of our offering, demonstrating our capabilities in Standards, Connectivity, Technical Capabilities, Features, Performance Metrics, and Security. **Exhibit 2.1.5-1** highlights some key strengths and benefits of our AA solution in relation to RFP Section M.2.1 evaluation criteria.

**Exhibit 2.1.5-1. Features and Benefits of MetTel Access Arrangements**

| Evaluation Criteria | Features and Benefits of MetTel's Approach |
|---|---|
| **Understanding (M.2.1(1))** | • 20 years of experience providing AAs to industry and Government<br>• Architecture that allows MetTel to offer the largest selection of access types and speeds from LECs, Tier-1 providers, and cable and wireless providers<br>• Reach to more locations than any single provider<br>• [redacted] |
| **Quality of Services (M.2.1(2))** | • AAs support the network or application service that rides over the network and the KPIs of those services with compliant connections |

| Evaluation Criteria | Features and Benefits of MetTel's Approach |
|---|---|
| | • 24x7x365 live customer support<br>• [redacted]<br>• Infrastructure that provides high availability and allows MetTel to meet required TTR intervals |
| **Service Coverage (M.2.1(3))** | • Larger footprint than any single provider, allowing MetTel to provide the right AA at the most competitive price in any CBSA or location<br>• [redacted] |
| **Security (M.2.1(4))** | • Strong partnership with access providers that comply with Agency security requirements<br>• Onsite technicians verified as U.S. citizens when necessary<br>• Telco facilities that provide access controls to protect the local access providers' end of the AA |

#### 2.1.5.1.1 Service and Functional Description [L.29.2.1, C.2.9.1, C.2.9.1.1]

Access management is a key part of the MetTel standard delivery model and we are in a unique position to provide Agencies the best choice in AA. [redacted] We have wholesale partnerships with most of the LECs, Tier-1 network providers, and cable and wireless providers. Through these partnerships, we provide the right technology to the customer complete with customized access and required diversity and path avoidance.

AAs provide connections between the Agency SDP and the network POP. We provide customized AAs that provide enhanced diversity and survivability. The following are examples of diverse AAs.

**Physically disparate, diverse paths from the SDP to two diverse contractors' POPs**

This configuration comprises two options: 1) the paths are diverse to two different POPs in the MetTel network, or 2) the second POP is in a second network provider's network and then connected to the MetTel network through the standard NNI with that network provider. The first solution is typically used for locations threatened by disruption due to natural disasters. For example, this scenario has been used effectively to provide redundancy in New Orleans, LA by providing access to two POPs in the MetTel network: [redacted] **Exhibit 2.1.5-2** depicts this customized AA.

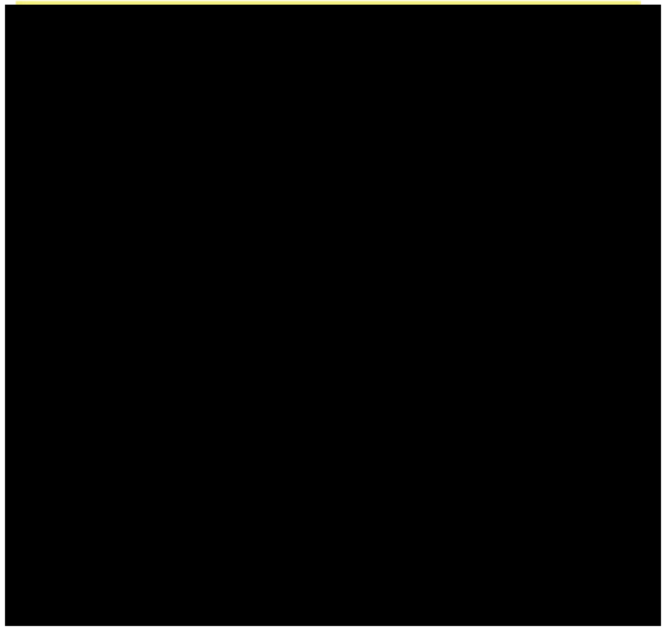


**Exhibit 2.1.5-2. Diverse Paths from the SDP to Two Diverse Contractors' POPs**

A variation to this diversity allows the second connection to be to an alternate provider network and connect to one of its POPs. This AA provides two diverse paths to disparate network providers: MetTel and an alternate provider network. **Exhibit 2.1.5-3** depicts this type of AA. The site in [redacted] would have a path to the [redacted] POP and a second to an alternate provider's network [redacted] with connectivity not running across any cable, facilities, or common fiber.

**Exhibit 2.1.5-3. Diverse Paths from the SDP to Two Providers' POPs**

**Physically disparate, diverse paths from the SDP to the MetTel POP**

Providing path diversity to the same POP requires designing the AA to avoid passing through the same telecommunications facility or over the same cable or fiber runs.

Minimum separation is 30 feet between the diverse routes and buildings where an SDP and its associated network connecting points are housed. Vertical separation is at least 2 feet with cables separately encased in steel or concrete for cable crossovers. This is achieved by building the two circuits using two disparate and diverse Serving Wire Centers (SWCs) and ensuring that the paths do not have any common elements.

Switching between the two routes is achieved by setting up BGP weighting so the primary path is used when available and a second path is used as an alternate. This can also be extended to use two different technologies' AA (e.g., one AA could be Ethernet and the other TDM DS-3). **Exhibit 2.1.5-4** shows an example of this type of configuration.

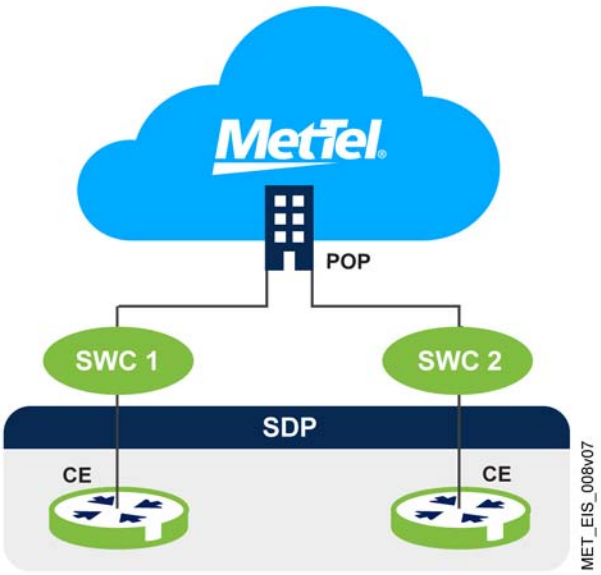



**Exhibit 2.1.5-4. Physically Diverse Paths to a Single MetTel POP**

**Redundant paths from an SDP to the MetTel POP**

This configuration provides redundant connections from the SDP to the MetTel POP. Both circuits can be used to pass traffic, or one could be configured using BGP as a hot stand-by for the other. Terminating each circuit in a different router provides protection against a single router or circuit failure interrupting service. The circuits terminate in different PE routers at the MetTel POP. **Exhibit 2.1.5-5** shows redundant paths between the SDP and the MetTel POP.

**Exhibit 2.1.5-5. Redundant Paths from an SDP to the MetTel POP**

### Redundancy through Ring Architecture

An additional form of redundancy is achieved by using SONET ring technology for the AA for one circuit and TDM technology for the second. In **Exhibit 2.1.5-6**, both circuits go to the same MetTel POP—the primary being a SONET ring with its self-healing capabilities and the redundant circuit being a TDM or other technology. In this configuration, both can be active or one can be active and the second a failover circuit.

**Exhibit 2.1.5-6. Redundant and Disparate Paths from an SDP to the MetTel POP**

**Special Construction**

We use all of our wholesale partnerships with local access providers to ensure all other options have been considered prior to initiating a special construction process necessary for services or facilities related to the delivery of an AA. Two general cases may require MetTel to initiate a special construction engagement:

1. If AA does not exist or does not have sufficient capacity and we must provide special construction by implementing, rearranging, or relocating a physical plant solely to comply with the Government's AA request.
2. If we require special construction to implement a different route. This can be from Government premise to PCL, PCL to an alternate contractor's POP, or some other route than we would otherwise use to provide the AA.

When special construction is required, we survey potential operational locations to collect and validate floor plans, physical measurements, building power capacity, equipment space and location, and external ingress/egress factors that impact the cost of special construction. We complete the physical inspection of the locations and deliver site survey reports in accordance with EIS RFP Section J.10 Special Construction Template for Site Survey Report.

#### 2.1.5.1.2 Standards [L.29.2.1, C.2.9.1.2]

AAs comply with all standards defined in RFP Section C.2.9.1.2 and listed in **Exhibit 2.1.5-7** with the appropriate AA from RFP Section C.2.9.1.4.

#### 2.1.5.1.3 Connectivity [L.29.2.1, C.2.9.1.3]

AAs are the connections between the SDP and the POP and interoperate with Agency-specified locations and equipment and the MetTel POP network.

#### 2.1.5.1.4 Technical Capabilities [L.29.2.1, C.2.9.1.4]

We built our network architecture on standards-based AAs and comply with all the standards listed in EIS RFP C.2.9.1.4 and defined in Exhibit 2.1.5-7. AAs provide integrated access of differentiated services and are transparent to any protocol. Exhibit 2.1.5-7 lists the MetTel-supported AAs and the standards associated with each.

## Exhibit 2.1.5-7. Supported Access Arrangements and Standards

| Access Arrangement | Channels and Line Rate | Un-channelized or Concatenated Payload or Increments | Notes and Standards |
|---|---|---|---|
| T-1 | 24 – DS0 (56/64 kb/s)<br>1.544 Mbps | 1.536 Mbps | 1. ANSI T1.102/107/403/503/510 for T1 |
| ISDN PRI | 23 – DS0 (56/64 kb/s)<br>ISDN PRI (23B+D)<br>1.544 Mbps | 1.544 Mbps | 2. ANSI T1.607/610 for ISDN PRI |
| ISDN BRI | 2 – DS0 (56/54 Kbps)<br>ISDN BRI (2B+D)<br>144 Kbps | | 2. ANSI T1.607/610 for ISDN PRI |
| T-3 | 28 – DS1 (1.536 Mbps)<br>44.736 Mbps | 43,008 Mbps | 3. Telcordia PUB GR-499-CORE for T3 |
| E-1<br>(Non-domestic) | 30 – DS0 (56/64 kb/s)<br>2.048 Mbps | 1.92 Mbps | 6. ITU-TSS G.702 and related recommendations for E1 and E3 |
| E-3<br>(Non-domestic) | 16 – E1 (1.92 Mbps)<br>34.368 Mbps | 30.72 Mbps | 6. ITU-TSS G.702 and related recommendations for E1 and E3 |
| SONET OC-3 | 3 – OC-1 (49.536 Mbps)<br>622,080 Mbps | 148.608 Mbps | OC-3c is concatenated<br>4. ANSI T1.105 and 106 for SONET<br>5. Telcordia PUB GR-253-CORE for SONET |
| SONET OC-12 | 4 – OC-3 (148.608 Mbps)<br>622.080 Mbps | 594.432 Mbps | OC-12c is concatenated<br>4. ANSI T1.105 and 106 for SONET<br>5. Telcordia PUB GR-253-CORE for SONET |
| SONET OC-48 | 4 – OC-12 (594.432 Mbps)<br>2.488 Gbps | 2.377728 Gbps | OC-48c is concatenated<br>4. ANSI T1.105 and 106 for SONET<br>5. Telcordia PUB GR-253-CORE for SONET |
| SONET OC-192 | 4 – OC-48 (2.488 Gbps)<br>10 Gbps | 9.510912 Gbps | OC-192c is concatenated<br>4. ANSI T1.105 and 106 for SONET<br>5. Telcordia PUB GR-253-CORE for SONET |
| [redacted] | [redacted] | [redacted] | [redacted] |
| Analog Line | 2 Wire 4 KHz | N/A | 2 wire analog lines and trunks without access integration for voice |
| DS0 | 56 Kbps and 64 Kbps | N/A | |
| [redacted] | [redacted] | | [redacted] |
| Optical Wavelength | a) 1 Gbps | | Bi-directional wavelengths (WDM) |

| Access Arrangement | Channels and Line Rate | Un-channelized or Concatenated Payload or Increments | Notes and Standards |
|---|---|---|---|
| | b) 2.5 Gbps<br>c) 10 Gbps<br><br><br><br><br>d) 40 Gbps | | 7. Frequencies grid and physical layer parameters for Optical Wavelength:<br>a) DWDM: ITU G.692 and G.694 as mandatory and G.709 and G.872 as optional<br>b) WDM: ITUG.694.2 and Telcordia GR 253<br>Not offered by MetTel. |
| [redacted] | [redacted] | [redacted] | [redacted] |
| DSL<br>1. ADSL<br><br><br>2. SDSL<br><br><br><br>3. ISDN DSL (Optional) | <br>Upstream 16 to 768 Kbps<br>Downstream 1.5 to 8 Mbps<br><br>Up to and including 1.5 Mbps<br><br><br><br>Up and down 144 Kbps | <br>Asymmetric<br>Up to 50 Mbps (Optional)<br><br>Symmetric<br>Up to 2.3 Mbps (Optional)<br>(Not offered) | 11. DSL – ADSL and SDSL:<br>a) ADSL and DSL Forums<br>b) ITU-TSS Recommendation G.992 for ADSL (interoperable DSL modem and DSLAM line card)<br>c) ANSI T1.413 (compatible DSL modem and DSLAM line card from the same manufacturer)<br>Not offered by MetTel. |
| Ethernet<br><br><br>(Optional)<br>(Optional) | 1 Mbps to 10 Mbps<br>10 Mbps to 100 Mbps<br>100 Mbps to 1 Gbps<br>2 Gbps to 10 Gbps<br>10 Gbps to 100 Gbps | 1 Mbps increments<br>10 Mbps increments<br>100 Mbps increments<br>1 Gbps increments<br>10 Gbps increments | 13. Ethernet Access: IEEE 802.3, including 10 Base-T/TX/FX, 100 Base-TX/FX, 1000 Base-T/FX/L/LX/B/BX/PX, and 10/40/100 Gigabit Ethernet (IEEE 802.3ae and ba)<br>Not offered by MetTel. |
| Cable High-Speed (OPTIONAL) | 256 Kbps to 5 Mbps<br>256 Kbps to 10 Mbps<br>256 Kbps to 150 Mbps | | Standard DOCSIS 1.0<br>Standard DOCSIS 1.1<br>Standard DOCSIS 3.0 |
| [redacted] | | | [redacted] |
| Wireless<br>a) Cellular Service<br><br>b) Line of Sight | <br>100 Mbps (downstream )<br>50 Mbps (upstream)<br>DS1<br>NxDS1 (where N=2 to 27<br>DS3<br>E1<br>NxE1 (where N=2 to 15)<br>E3<br>SONET OC-3<br>1 Gbps, 5 Gbps and 10 Gbps | | <br>4G Long-term Evolution (LTE)<br><br>Using licensed frequencies and technology specified in the Task Order.<br><br>(Non-domestic)<br>(Non-domestic)<br>(Non-domestic) |

#### 2.1.5.1.5 Access Diversity and Avoidance [L.29.2.1, C.2.9.2]

**Access Route or Path Diversity**

We provide access route and path diversity on at least two physically separated routes for access diversity. The following options for access route and path diversity are available:

1. Between an SDP and its associated connecting network's PCL or POP. Exhibit 2.1.5-5 and Exhibit 2.1.5-6 show this option.
2. Between an SDP and at least two connecting network PCL/POPs. Exhibit 2.1.5-2 shows this configuration.
3. Access from the same or different access providers (e.g., LEC or CLEC) for two separate routes, using any mix of AAs. Exhibits 2.1.5-3 and 2.1.5-4 show this configuration.

Diverse routes meet the following requirements:

1. No sharing of common telecommunications facilities, offices, or common building entrance.
2. Minimum separation of 30 feet maintained for all diverse routes between premises/buildings where an SDP and its associated network connecting point are housed.
3. Minimum vertical separation of 2 feet, with cables encased (separately) in steel or concrete for cable crossovers.

We provide the routing protocol (i.e., BGP etc.) for automatic switching of transmission in real-time, negotiated on an individual basis at the time of Task Order. Automatic switching occurs in the following two cases:

1. From the primary access route to one or more diverse access routes, including satellite connections.
2. From the diverse access route to the primary access route once the primary has resumed an operational status.

**Access Route or Path Avoidance**

We allow the Agency to identify and define a geographic location or route to avoid between an SDP and its associated connecting network point (PCI/POP). This requirement is defined in the Agency Task Order.

**Control, Representation, and Management of Diverse, Disparate, and Avoidance Routes**

We provide overall management and control of diverse path and path avoidance designs and implementations. During the design phase of diverse, disparate and avoidance routes, we create graphical representation of access circuit routes to show where diversity has been implemented. We provide these diagrams to the OCO with the as-built implementation of access diversity or avoidance within 30 calendar days of implementation of circuit routes and again anytime a change is made.

We collaborate with local access providers prior to any proposed reconfiguration or re-grooming that would impact routes previously configured for access diversity or avoidance. We provide written notification and revised Physical Concentration Locations (PCLs) for OCO approval in accordance with the requirements of the Task Order.

Agencies can specify in a Task Order that a route or path must avoid passing through or near an SDP and its associated connecting network points (i.e., Serving Wire Centers). This is a special case of diversity and disparity that requires the same detail definition and management. We create graphical representation of the circuit layout showing where avoidance has been implemented. We provide these diagrams to the OCO within 30 calendar days of the implementation of avoidance and again anytime a change is made. Prior to any reconfiguration of routes previously configured for avoidance, we provide written notification and revised PCLs to the OCO for review and approval in accordance with the requirements of the Task Order.

All diverse, disparate, or avoidance circuits are identified in our management platform. Interactions with LECs and Tier-1 providers also tag circuits with these requirements and are reviewed with the providing entity prior to any change. Additionally, we meet with the AA providers at least quarterly to review all circuits tagged with diversity, disparate, avoidance, or other special requirements such as TSP priorities. Agencies are notified within 5 business days of any proposed changes or modifications to diverse, disparate, or avoidance tagged circuits.

#### 2.1.5.1.6 Interfaces [L.29.2.1, C.2.9.3]

**Exhibit 2.1.5-8** defines the SRE in the SRE Catalogue for each of the UNI Types required by EIS RFP Section C.2.9.3. The SRE interfaces are in the Notes column of the SRE Catalogue.

**Exhibit 2.1.5-8. SRE Interfaces for AA UNIs**

| UNI Type | Interface Type and Standard | Payload Data Rate or Bandwidth | Signaling Type | SRE Configuration Item |
|---|---|---|---|---|
| 1 | ITU-TSS V.35 | Up to 1.92 Mbps | Transparent | AA-1 |
| 2 | EIA RS-449 | Up to 1.92 Mbps | Transparent | AA-2 |
| 3 | EIA RS-232 | Up to 19.2 Kbps | Transparent | AA-3 |
| 4 | EIA RS-530 | Up to 1.92 Mbps | Transparent | AA-4 |
| 5 | T1 (with ESF) (Std: Telcordia SR-TSV-002275; ANSI T1.403) | Up to 1.536 Mbps | Transparent<br>IP (v4/v6) | AA-5 |
| 6 | ISDN PRI (23B+D and 24B+0D) (Std: ANSI T1.607/610) | Up to 1.472 Mbps | Transparent | AA-6 |
| 7 | T3 (Std: Telcordia GR-400-CORE) | Up to 43.008 Mbps | Transparent | AA-7 |
| 8 | E1 (Std: ITU-TSS) | Up to 1.92 Mbps G.702) (Non- domestic) | Transparent | AA-8 |
| 9 | E3 (Std: ITU-TSS G.702) (Non-domestic) | Up to 30.72 Mbps | Transparent | AA-9 |
| 10 | SONET OC-3 (Std: ANSI T1.105 and 106) | 148.608 Mbps | Transparent | AA-10 |
| 11 | SONET OC-3c (Std: ANSI T1.105 and 106) | 148.608 Mbps | Transparent | AA-11 |
| 12 | SONET OC-12 (Std: ANSI T1.105 and 106) | 594.432 Mbps | Transparent | AA-12 |
| 13 | SONET OC-12c (Std: ANSI T1.105 and 106) | 594.432 Mbps | Transparent | AA-13 |
| 14 | SONET OC-48 (Std: ANSI T1.105 and 106) | 2.377728 Gbps | Transparent | AA-14 |
| 15 | SONET OC-48c (Std: ANSI T1.105 and 106) | 2.377728 Gbps | Transparent | AA-15 |
| 16 | SONET OC-192 (Std: ANSI T1.105 and 106) | 9.510912 Gbps | Transparent | AA-16 |
| 17 | SONET OC-192c (Std: ANSI T1.105 and 106) | 9.510912 Gbps | Transparent | AA-17 |
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |

| UNI Type | Interface Type and Standard | Payload Data Rate or Bandwidth | Signaling Type | SRE Configuration Item |
|---|---|---|---|---|
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| 20 | 10 Base-T/TX/FX (Std: IEEE 802.3) | Link bandwidth: Up to 10 Mbps | IP (v4/v6) IEEE 802.3 Ethernet MAC (for bridging) | AA-20 |
| 21 | 100 Base-TX/FX (Std: IEEE 802.3) | Link bandwidth: Up to 100 Mbps | IP (v4/v6) IEEE 802.3 Ethernet MAC (for bridging) | AA-21 |
| 22 | 1000 Base-T/L/LX/B/BX/PX (Std: IEEE 802.3) | Link bandwidth: Up to 1 Gbps | IP (v4/v6) IEEE 802.3 Ethernet MAC (for bridging) | AA-22 |
| 23 | 10 Gbps (Std: IEEE 802.3) | Link bandwidth: Up to 10 Gbps | IP (v4/v6) IEEE 802.3 Ethernet MAC (for bridging) | AA-23 |
| 24 | Reserved | | | |
| 25 | ISDN BRI (2B+D) (Multirate) [Standard: ANSI T1.607 and 610] | 144 Kbps | ITU-TSS Q.931 IP (v4/v6) | AA-25 |
| 26 | 3G / 4G / 4G LTE (Cellular Service) | Up to current standard | ITU 3GPP TR25.913 IP (v4/v6) | AA-26 |