

Synchronous Optical Networking Service (SONETS)

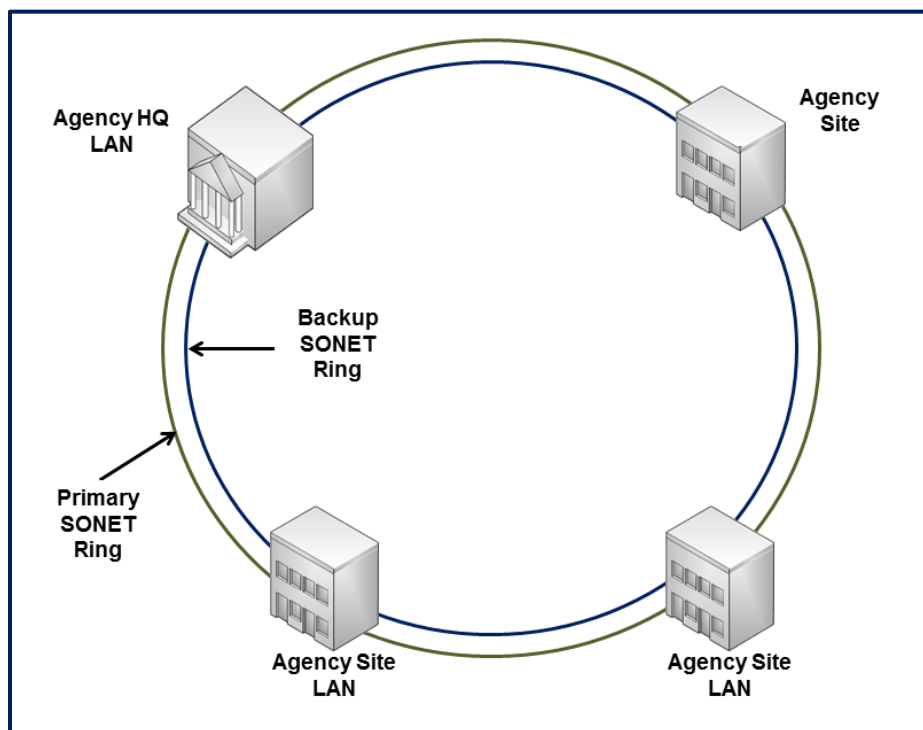
SONET, the U.S. standard for fiber optic synchronous transmission, enables the transport of voice, data, and multimedia information at rates ranging from 51.84 Mbps to over 40 Gbps. The EIS SONET service (SONETS) is highly reliable due to its proactive performance monitoring that prevents single and multiple failures, supports self-healing functions, and enables robust network management. This service is especially suitable for agencies that have critical needs for reliable and rapid transmission of large amounts of information between locations.

Category: Data Service

Complementary Services Needed: In order to use this service, the agency would need EIS Access Arrangements (AAs) or equivalent.

Definitions: Please see EIS contract [Section J.12 Glossary of Terms](#) for clarification of technical terms and acronyms.

Figure 1—Synchronous Optical Network Service (SONETS)



1. Why an Agency Might Select this Service

- Available in a wide range of interface speeds ranging from 51.84 Mbps to over 40 Gbps
- Self healing, dedicated optical fiber ensures a high level of reliability, more than 99.999% for Critical Service Level
- Supports all common networking protocols including Circuit Switched Voice, Asynchronous Transfer Mode, Frame Relay, and Internet Protocol
- Assurance of high service level based on Service Level Agreements (SLAs) and Quality of Service (QoS) guarantees

2. Examples of How SONETS Could be Used

- **Flexibility:** SONETS supports a wide range of digital signals with different capacities, and its interworking capability enables seamless communications between devices that support dissimilar protocols such as IP, Frame Relay, and ATM. Hence, existing services using such protocols can be transported over SONETS for increased protection, security and performance.
- **Self Healing:** SONETS can be utilized in a redundant ring configuration with multiple end-user Service Delivery Point (SDPs) and Carrier Points-of-Presences (POPs) along the ring, thus enabling long distance coverage. In this scenario, the working ring takes care of all the traffic while a secondary protection ring remains on standby until the working ring fails. SONETS will automatically detect the failure in the working ring and transfer control to the protection ring within a fraction of a second. This is why a SONET network is often referred to as a “Self Healing Network.”
- **Security:** Federal, state, and local government agencies use SONET networks to collect, process, and disseminate law enforcement intelligence information in real time between agencies to combat crime and terrorism.
- **Continuity of Operations:** SONET's self healing nature increases its ability to survive a disaster, making it a natural choice for Continuity of Operations (COOP) and Disaster Recovery planning.

3. Key Technical Specifications

NOTE: This portion of the service guide has been abridged due to space considerations. Please see EIS contract [Section C.2.1.5 Synchronous Optical Network Service](#) for full technical details.

Table 1—SONETS Technical Capabilities

| Capability | Description |
|---|--|
| Geographical Coverage | <ol style="list-style-type: none"> 1. Metro Areas (Local) 2. Continental US (CONUS) 3. Non-Domestic (OCONUS) (NOTE: May not be available from all contractors.) |
| Network Topologies | Point-to-Point, Ring, and Mesh Topologies supported. |
| Gateway Functionality | SONETS to Synchronous Digital Hierarchy (SDH) and SDH to SONETS conversion, as needed by the Agency. (NOTE: May not be available from all contractors.) |
| Protection Methods | <ol style="list-style-type: none"> 1. On the Tributary Side: <ul style="list-style-type: none"> • Automatic Protection Switching (APS) 1:N, where $N \leq 14$ • APS 1+1 • Unprotected 2. On the Network Side: <ul style="list-style-type: none"> • Unprotected • Mesh Protection • Unidirectional Path Switched Ring (UPSR) • Bidirectional Line Switched Ring (BLSR) • (Optional) Bidirectional Path Switched Ring (BPSR) or equivalent (NOTE: May not be available from all contractors.) • 1+1 |
| Transmux Capability | <ol style="list-style-type: none"> 2. DS3/STS1 transmuted to DS1* 3. OC3 transmuted to DS3/STS1 3. OC12 transmuted to OC3/DS3/STS1 4. OC48 transmuted to OC12/OC3/DS3/STS1 5. OC192 transmuted to OC48/OC12/OC3/DS3/STS1* <p>*May not be available from all contractors.</p> |
| Concatenation Methods (NOTE: May not be available from all contractors.) | <ol style="list-style-type: none"> 1. Standard Concatenation. 2. Virtual Concatenation. (NOTE: May not be available from all contractors.) 3. High Order Concatenation 4. Low Order Concatenation |
| Performance Monitoring | <ol style="list-style-type: none"> 1. Errored Seconds 2. Severely Errored Seconds (SES) |
| Synchronization and Timing Methods | <ol style="list-style-type: none"> 1. External Timing 2. Line Timing |

| <i>Capability</i> | <i>Description</i> |
|--|--|
| SONETS Interfaces | <ol style="list-style-type: none"> 1. Optical Interfaces from OC-1 up to OC-768 2. Electrical interfaces from DS1 through STS-1 |
| Next Generation SONETS (NOTE: May not be available from all contractors.) | This capability may requested by the Agency from the contractor of choice. |
| Generic Framing Procedure | <ol style="list-style-type: none"> 1. Frame Mapped Generic Framing Procedure 2. Transparent Generic Framing Procedure |
| Data Communications Channel (DCC) (NOTE: May not be available from all contractors.) | Ability to establish communication between its edge devices. |
| Integrated Control Plane (i.e. ASON based, GMPLS) (NOTE: May not be available from all contractors.) | Support of an integrated, intelligent control plane in order to speed up activation service times, provide control to agencies to the contracted infrastructure, and achieve inter- and intra-contractor interoperability when required. |

Table 1—SONETS Features

| Feature | Description |
|--|--|
| Channelization (NOTE: May not be available from all contractors.) | The following channelized arrangements are supported as a minimum: <ol style="list-style-type: none"> 1. STS-1 payload with VT1.5, VT2 2. STS-1, STS-1 payload, VT1.5, VT2, STS-3c 3. VC-11(DS1), VC-12 (E1), VC-3 (DS3, E3, other) 4. VC-4, VC-3, VC-11, VC-12 5. Down to STS-1 (E3, other) 6. STM-1, VC-11 (DS1), VC-12 (E1), VC-3 (DS3, E3, other), VC-4 |
| DS1 Rate Synchronization Service (NOTE: May not be available from all contractors.) | This feature allows the Agency's Stratum 2 or Stratum 3 clocks at its locations to synchronize to a Stratum 1 clock at the contractor's location. The DS1 to be used for synchronization is delivered through the External Timing method. |
| SONETS Performance | All SONETS services contracted by the agencies comply with the following performance indicators and with the Performance Metrics included in Section C.2.1.5.4: <ol style="list-style-type: none"> 1. Jitter 2. Restoration Time |
| Equipment Protection – Network Side | This is protection to the Agency's interfaces at the SDP, where the protection channel is bridged to the failed working channel. |
| Framing for Electrical Interfaces | The following framing formats for electrical interfaces are supported: <ol style="list-style-type: none"> 1. M-frame with M23 multiplexing format. * 2. M-frame with C-parity. 3. Super Frame (SF) format. * 4. Bipolar Alternate Mark Inversion. * 5. Binary, 8 zero substitution line code. 6. Non-ANSI SF. * 7. ANSI Extended Superframe (ESF) (ANSI T1403, 1995). 8. Non-ASNI ESF (AT&T PUB 54016).* <p>*NOTE: May not be available from all contractors.</p> |
| Geographic Diverse Protection | This feature ensures a minimum separation of 25 feet between the diverse circuits' end-to-end and that the diverse circuits are specifically flagged to prevent disconnection during network grooming activity. |
| Local and Remote Node Multiplexing | This feature enables the multiplexing of different low-speed circuits onto a high-speed SONETS signal, such as SONETS OC3 and OC12. |

4. Pricing Basics for SONETS

Under EIS, SONETS is only available via contractor-defined Task Order Unique CLINs (TUCs).

Please visit the [EIS Resources Listing](#) and locate the [Basic EIS Pricing Concepts Guide](#) to gain an understanding of EIS pricing fundamentals.

4.1 Access Arrangements

Should Access Arrangements be needed, the Service Delivery Points (SDPs) and the contractor's Points of Presence (POPs) would have to be specified. Please visit the [EIS Resources Listing](#) and locate the [Access Arrangements Guide](#) for more detailed information.

4.2 Service Related Equipment (SRE)

- SRE must be chosen based on equipment required at each location. NOTE: SRE uses catalog-based pricing.
- Request that contractor provide pricing for any SRE that would be required, in addition to the agency's existing infrastructure, to deliver the service.
- Please visit the [EIS Resources Listing](#) and locate the [Service Related Equipment Service Guide](#) for more detailed information.

4.3 SONETS Price Components

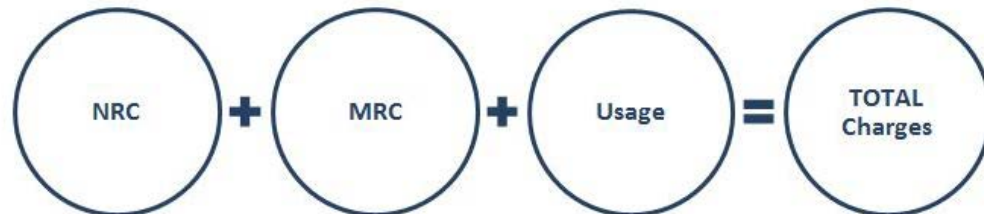
The price structure for SONETS consists of the components shown in *Table 3* below.

Table 2—SONETS Pricing Components

| Component | Charging Unit |
|-------------------------------------|--|
| TUC: Non Recurring Charge (NRC) | Determined on Individual Case Base (ICB) per the contractor-defined TUC(s) |
| TUC: Monthly Recurring Charge (MRC) | " |
| TUC: Usage | " |

Figure 2 below shows how the pricing components in Table 3 are combined to produce the total cost for the service.

Figure 2—This figure shows how the various pricing components in Table 3 would be combined to calculate the total SONETS charges. NOTE: One or more of these components may not be needed to price a particular service package.



The details of the different components in Figure 2 above, and their associated costs, would be determined using contractor-defined TUCs. The two TUC pricing tables for this service can be found in EIS contract [Section B.2.1.5.2 SONETS Task Order Unique CLINs](#). (Please visit the [EIS Resources Listing](#) and locate the [Basic EIS Pricing Concepts Guide](#) for instructions on using the pricing tables to compute the cost of a service.)

4.4 SONETS Pricing Examples

NOTE: No pricing examples are provided for SONETS, as all SONETS services are priced by contractors on an individual case basis using TUCs.

5. References and Other Sources of Information

- For more details and information on SONETS technical specifications and requirements, please refer to EIS contract [Section C.2.1.5](#); for pricing details, please refer to [Section B.2.1.5](#).
- For more information on service-related items, please see:
 - EIS contract [Section B.2.10 Service Related Equipment](#)
 - EIS contract [Section B.2.11 Service Related Labor](#)
- Please refer to a contractor's individual EIS contract for specifics on the contractor's SONETS offerings.
- For additional EIS information and tools, visit the [EIS Resources Listing](#).
- For guidance on transitioning to EIS, please visit [EIS Transition Training](#) where you'll find several brief video training modules.