

VENDOR NAME: FRONTIER (AT&T/SBC)

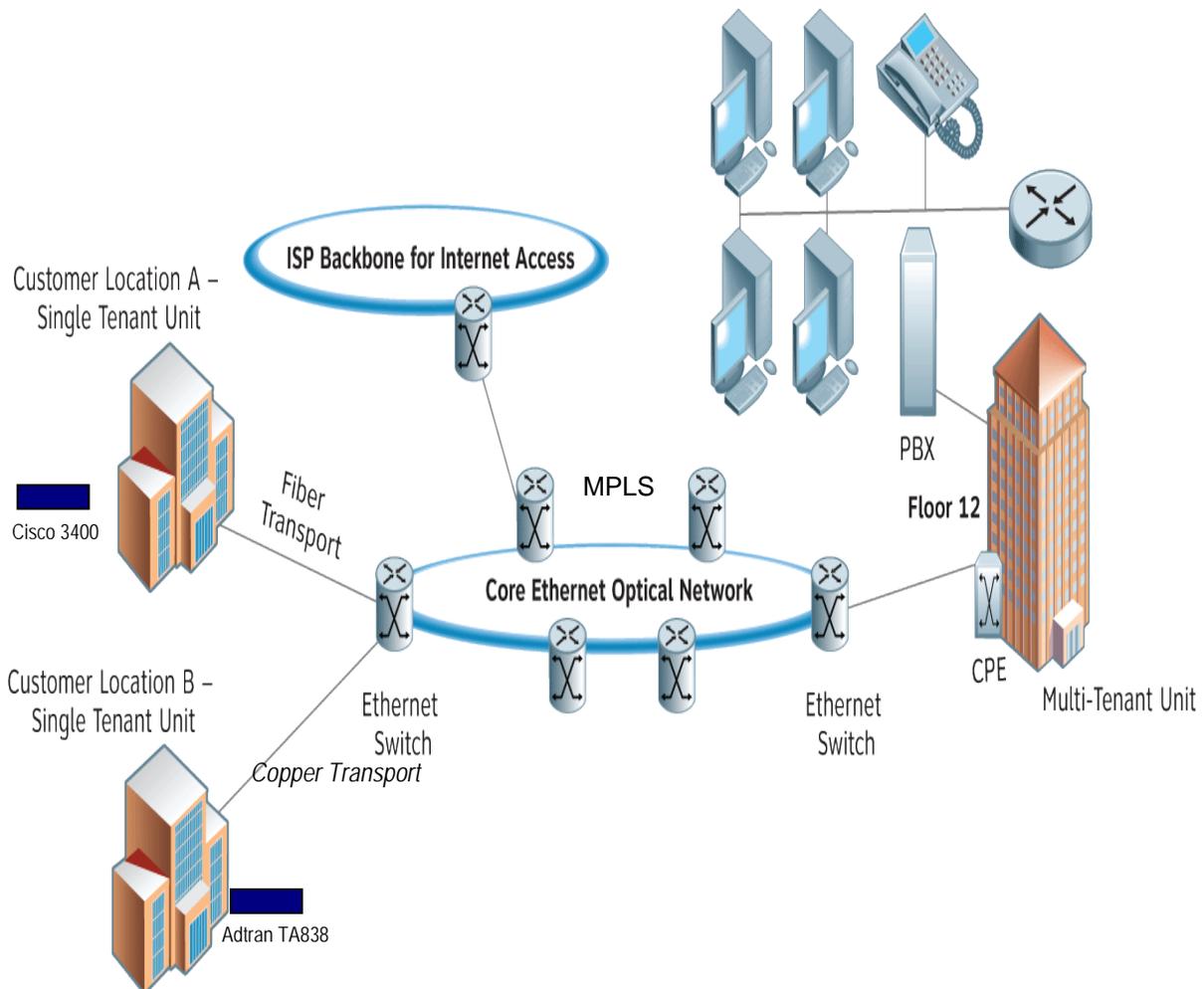
SERVICE/PRODUCT NAME: SWITCHED ETHERNET SERVICE: OPT-E-MANSM

SERVICE/PRODUCT DESCRIPTION:

OPT-E-MAN Service is an optically switched data service which allows for versatile scalability and flexibility over an Ethernet network. OPT-E-MAN Service allows businesses to interconnect two or more customer locations within a Metropolitan Area Network (MAN) as if they were segments on the same LAN using packet-based switching technologies. Connections at the customer premises are made using Native Ethernet interfaces and traverse the MAN over fiber or copper facilities. OPT-E-MAN Service provides dedicated bandwidth from 2 Mbps to 10 Mbps over copper facilities and up to 1 Gbps over fiber facilities.

OPT-E-MAN supports point to point, point-to-multipoint and multipoint-to-multipoint configurations using Ethernet Virtual Connections (EVCs) to transmit Ethernet LAN packets. The transport connects to network terminating equipment at the customer location. Data is transported through the Frontier MPLS network powered by central office based Cisco 7609s.

OPT-E-MAN NETWORK ARCHITECTURE



Components

OPT-E-MAN Service includes the connection from the customer's premise to the Ethernet network, a port on the Ethernet network, a Committed Information Rate (CIR), and Ethernet Virtual Connections (EVCs). EVCs are connections that establish a logical path for customer traffic between two customer locations. A Frontier network terminating device is also included and placed at the customer location.

A portion of the CIR is assigned to each EVC to establish bandwidth per path. CIR is inclusive of allowances for overhead within the Ethernet network. If a customer orders 1 Gbps of CIR on a single port, Frontier reserves the right to use up to 10% of the bandwidth for traffic management.

Customers may connect to OPT-E-MAN Service via one of the following standard network connections:

- 10/100 Base T (100Mbps)
- Gigabit Ethernet (1000 Base SX, 1000 Base LX/LH and 1000 Base ZX)

Fiber Transport:

Locations that are located outside normal transmission parameters, or are served by a Serving Wire Center that is not equipped for OPT-E-MAN Service may require a repeater. An engineering study will be completed to ensure transmission parameters can be met.

Copper Transport:

Mid-Band OPT-E-MAN Service for 2 Mbps to 10 Mbps can be provisioned over copper facilities if the location is within 12,000 ft of an Ethernet over Copper equipped Central Office.

Interface Options

Interface	Handoff	Bandwidth Limit	Distance Limit
10/100 Mbps Base T	Copper	100 Mbps	100 M
1000 Base SX	Fiber (multi mode)	1 Gbps	550 M
1000 Base LX/LH	Fiber (single mode)	1 Gbps	550 M-10Km
1000 Base ZX	Fiber (single mode)	1 Gbps	70 Km

Grade of Service

A Best Effort Grade of Service is available on 2, 4 and 8 Mbps. SLAs do not apply to Best Effort and should be used for non-critical data only.

Bronze and Silver Grades of Service are available for all speeds. Bronze is used for general data applications and Silver is used for applications requiring minimal loss and low jitter such as Voice over IP or video.

If a customer purchases the Silver Grade of Service for CIR, the initial EVC will be prioritized as Silver. Additional EVCs can be prioritized as either Silver or Bronze. However, if a customer purchases the Bronze Grade of Service for CIR, additional EVCs cannot be prioritized as Silver, but only as Bronze.

OPT-E-MAN Monitoring and Security

The service will be monitored 24 x 7 x 365 by the Enhanced Network Operations Center (ENOC) to provide an added level of security and reliability to the product. The ENOC will be the first point of contact for the customer in cases of trouble. Customers can contact the ENOC by calling 1-877-902-1100 for information on their OPT-E-MAN service.

Frontier uses provider VLAN and MPLS tags to segregate customer traffic. Frontier provides the same level of security for traffic as with Frame/ATM by establishing a Ethernet VPN through the

MPLS based network.

In addition to the security provided in the core of the network, added security measurements are implemented on the Frontier owned equipment located at the customer site.

- The Cisco 3400 or Adtran Total Access 838 is locked in a secure Telco space.
- Password Recovery is disabled. Should anyone attempt to recover the password, the entire configuration will be cleared.
- There is a limit on the number of MAC addresses that can be learned per port. This protects from a "MAC address Denial of Service (DOS) attack".
- Prune VLANs (including Reserved VLANs) allow only the required VLANs.
- VLAN 1 minimization closes a possible way for malicious users to launch attacks that may affect other users connected to the same 3400.
- Control packets (including CDP) are filtered preventing DoS attacks.
- Broadcast Storm Control protects against DoS attacks.

Environmental Requirements

Space

The customer shall provide a safe, secure, dust-free environment. This location should be free of any major EMI/RFI fields. The OPT-E-MAN® equipment cannot be closer than 3' from any primary source of power. The terminating equipment will be placed in a FRONTIER (AT&T/SBC) or customer provided 19" or 23" bay or cabinet approved by Frontier. OSHA requires a minimum of 36" to the front and rear of the bay/cabinet. The bay/cabinet has to be securely mounted and earthquake braced by bolting to the floor.

Power

The Cisco WS-3400-24-SMI or WS-3400-12G requires one dedicated fused/breaker, 15 amp, 110V AC outlet, properly grounded with 3 prongs. This receptacle must be located within 6' of the Cisco equipment.

Grounding

Relay racks/cabinets must be grounded by placing an exposed #6 or larger grounding wire to the building's ground source. This ground wire will be attached to the closest ground rod (earth ground) or building bus bar available and run to the OPT-E-MAN® location in the room. In addition, the 110V, 15 amp AC outlet must be 3 prong and properly grounded.

Fiber Termination / Circuit Handoff

There are currently two (2) options available for Termination

- 1) Rack mounted in an Frontier or customer provided 19" or 23" aluminum or steel relay rack.
- 2) Wall mounted on a customer provided 3/4"x 4'x 6' plywood backboard.

Special Construction

In order to bring the circuit to the customer location and meet the environmental requirements, the customer may incur additional charges. These charges are determined on an individual case basis following an Engineering Site Survey.

Conduit/Path (Property line to Minimum Point of Entry/MPOE)

All conduits on the building's property are "subscriber conduit" and are the responsibility of the property owner to maintain and repair. FRONTIER (AT&T/SBC) shall place inner duct/fiber liner within this section.

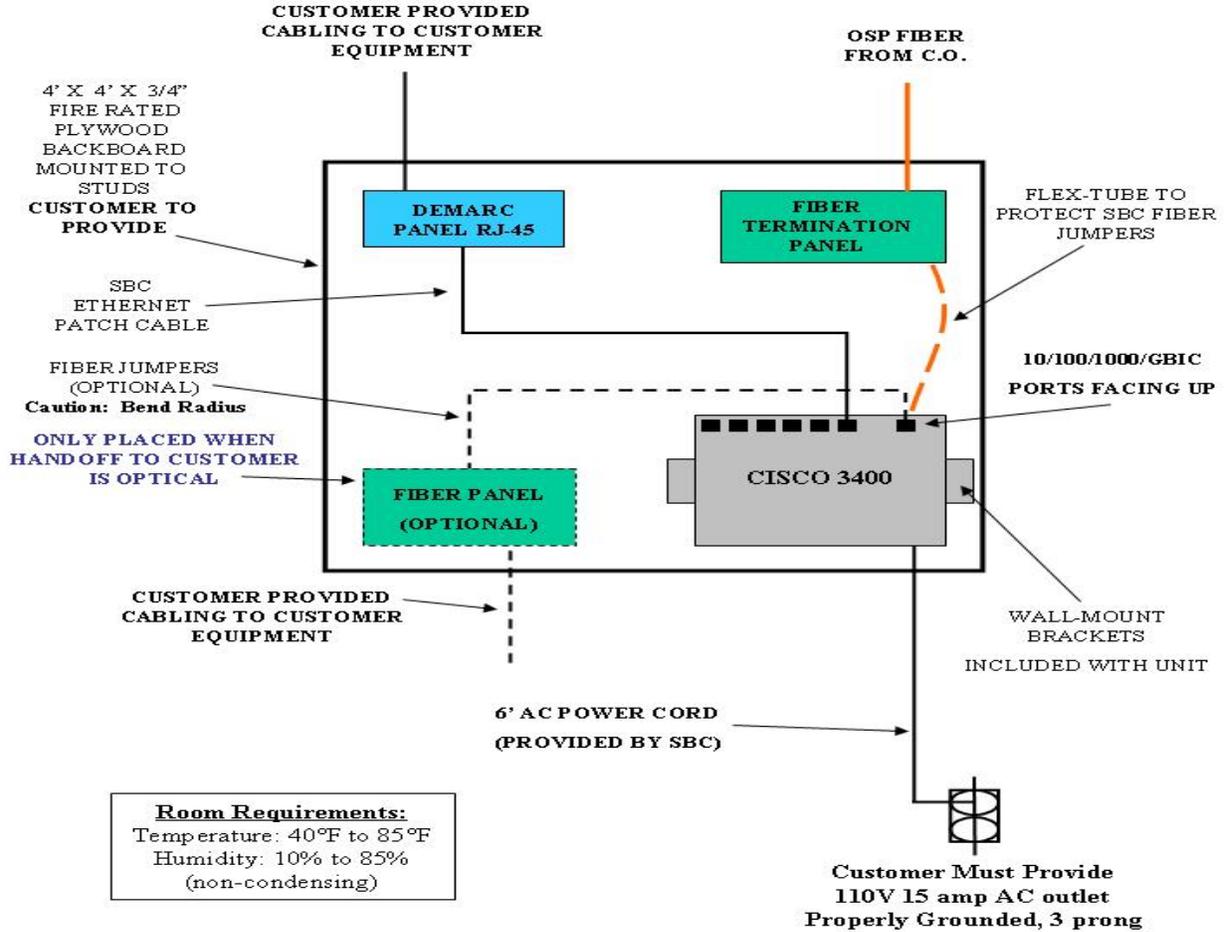
Conduit/Path (Fiber termination to OPT-E-Man location)

Frontier requires the OPT-E-MAN® to be placed in the MPOE. If there is no space in the MPOE, or if the customer requests that the switch be placed in their computer room, the customer will assume the responsibility of providing the path from the MPOE to that location. Additional charges may apply for a second demarcation point on an individual case basis. The customer shall provide conduit (min. 2" EMT) and hard plastic corrugated inner duct with pull rope through which the fiber will be placed. The size of the conduit will be dependent on the future growth of the customer. Any more than 300' or 2 - 90 degree turns in the path will require a pull box (12"x12"x18" minimum).

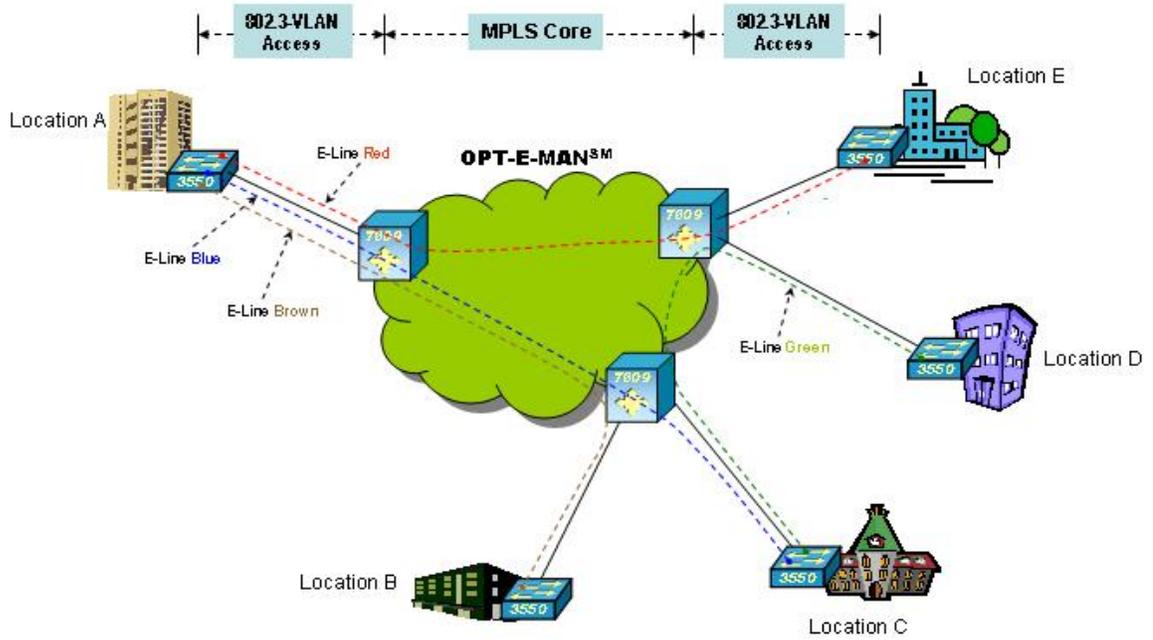
Customer Site Preparation Document

Wall-Mounted Cisco 3400

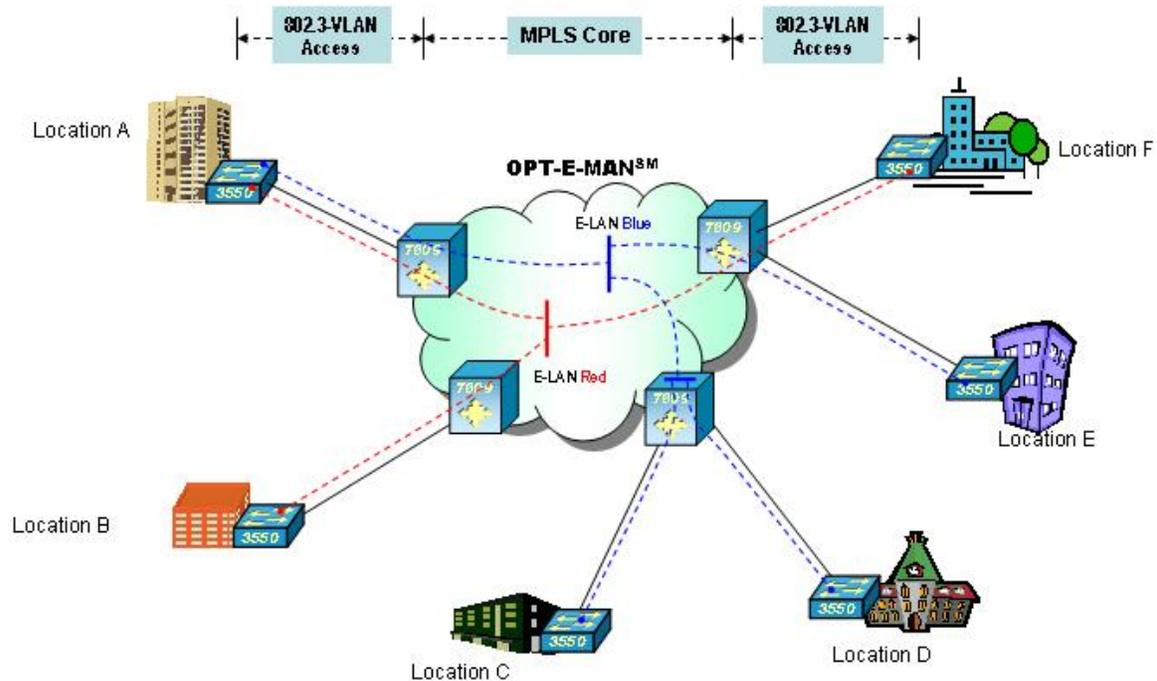
OPT-E-MAN



Basic Point to Point – Logical View



Multi-point to Multi-point – Logical View



National Security Emergency Preparedness (NS/EP) Telecommunications Service Priority (TSP) System

In 1988, the Federal Communications Commission revised the Restoration Priority System with the National Security Emergency Preparedness (NSEP) TSP System. This system ensures priority treatment of restoration to telecommunication services following natural or technical disasters.

TSP assigned telecommunication services are provisioned and restored before non-TSP services. Any Federal, State and local government, private industry or foreign government with telecommunications services supporting a national security or emergency preparedness mission qualifies for TSP.

Provisioning

If Frontier receives an Emergency (E) provisioning priority it must take immediate action to provide the service at the earliest possible date, including dispatching service personnel outside of normal business hours. The FCC order requires that service vendors provision Emergency (designated by an E) TSP services before any Essential (designated by a 1, 2, 3, 4, or 5) TSP service or non-TSP services. The order processing is escalated up through management as far as necessary to complete the order. Service vendors receiving service requests with an Essential provisioning priority must make their best effort to provide the TSP services by the service user's requested due date.

Restoration

When a trouble report is received, or Frontier otherwise recognizes that the TSP circuit is out or unusable, it must allocate available resources to restore the service as quickly as possible. TSP services assigned restoration priorities of 1, 2, or 3 require dispatch outside normal business hours. Vendors must dispatch service personnel outside normal business hours to restore TSP service assigned a 4 or 5 priority only when the next business day is more than 24 hours away.

Sponsorship

The FCC designated the Executive Office of the President (EOP) as administrator of the TSP Program. The EOP delegated its responsibilities to the Manager of the National Communications System (NCS), which, in turn, assigned the administration and execution of the TSP Program to the Office of Priority Telecommunications (OPT) located at the NCS. The primary roles of a Federal sponsor are to:

- Review and determine whether to approve foreign, State, and local government and private industry requests for priority actions.
- Affirm that the requested priority level assignment is appropriate.

Sponsorship for TSP may be obtained from the National Communications System through the TSP Web Site at <http://tsp.ncs.gov>.

SERVICE LEVELS:

Service Level Agreements (SLAs)

Network Availability

- SLA of 99.95% per month
- Service outage credit is offered per location due to service disruption
- Network Availability of 99.95% per month, including the local loop, is provided by Frontier. This equates to less than 21.6 minutes of downtime per month (based on a 30-day month), excluding maintenance windows. Network Availability is calculated as the percentage of time that the OPT-E-MAN network is capable of accepting and delivering customer data to the total time in the measurement period. The calculation for Network Availability for a given calendar month is as follows:

Network Availability =

$$\frac{[24 \text{ hours} \times \text{days in month} \times 60 \text{ minutes} \times \text{number of customer sites}] - \text{network outage time (measured in minutes)}}{[24 \text{ hours} \times \text{days in month} \times 60 \text{ minutes} \times \text{number of customer sites}]}$$

- SLAs do not apply to Best Effort Grade of Service

Grade of Service

- Bronze- Packet Delivery Rate-99.5% , Latency-35 ms one way
- Silver- Packet Delivery Rate-99.9%, Latency-25 ms one way, Jitter-15 ms
- Packet Delivery Rate (PDR), Latency and Jitter calculations are measured when the OPT-E-MAN network is available.

In case of an interruption to service, the customer shall be credited for an interruption of 10 seconds or more. The credit shall be at the rate of 10/8640 of the monthly charges for the service for each period of 5 minutes or major fraction thereof that the interruption continues. The credit allowance(s) for service interruptions shall not exceed 100% of the applicable monthly rates.

Installation Intervals

Standard

Fiber based: 90 days or mutually agreed upon due date established on location by location basis based on fiber and equipment availability.

Copper based: 30 days

Expedite

If a customer desires that service be provided on a due date less than the standard installation interval, the customer may request that service be provided on an expedited basis. If Frontier determines that service can be provided on the requested expedited date and spare facilities are available, the Expedite Order Charge (per port, per location) will apply.

Cancellation

If a customer cancels service prior to installation being completed, a Service Order Cancellation Charge (per port, per location) will apply. The customer's intent to cancel service must be made in writing.

Routine Repair Intervals

Response time = Less than 1 hour

Repair Resolution time = 4 hours or less

Repair Service Level Definitions:

Repair Response is the time elapsed between when Frontier receives a report of a problem or otherwise becomes aware of a problem, and the time that Frontier responds to the end user or other designated contact to verify the problem.

Repair Resolution Time means the elapsed time between when the State notifies Frontier of a problem, and the time that Frontier restores service and such service is acceptable to the State.

SERVICE AVAILABILITY/LIMITATIONS:

See Service Availability spreadsheet

LIMITATIONS

1. OPT-E-MAN Service is provided at the option of Frontier where equipment and facilities permit. If appropriate facilities are not available, Special Construction charges may apply. Charges are determined on an individual case basis.
2. If a customer connects to the OPT-E-MAN network using a bridge or switch for Layer 2 (Ethernet data linklayer) connectivity, only 50 Media Access Control (MAC) addresses can be used per Layer 2 device, per port. Any additional addresses will be assessed an additional charge, with a maximum limit of 100 MAC addresses total per port.
3. OPT-E-MAN does not allow for oversubscription. The sum total of the usage assigned to EVCs are mapped to a single port, and cannot exceed the ordered CIR.
4. For point-to-point or point-to-multipoint configurations, a total of 8 EVCs may be configured per 10/100 Base T connection, and a total of 64 EVCs may be configured per 1 Gbps connection.
5. For Multipoint to Multipoint, a total of 7 EVCs may be configured per 10/100 Base T connection, and a total of 63 EVCs may be configured per 1 Gbps connection.
6. Customer must reside within ~12KF (12,000 feet) of Central Office to qualify for Mid-Band OPT-E-MAN service over copper facilities.
7. Central Office must be provisioned for Ethernet over copper for Mid-Band OPT-E-MAN service.

VENDOR NAME: FRONTIER (SBC SNET)

SERVICE NAME: SWITCHED ETHERNET SERVICE: OPT-E-MAN

A 2% credit will be issued monthly against the items ordered from this Product Schedule per the FRONTIER (SBC SNET) Master Agreement

Activity (Add, Delete, Change)	Date of Vendor Request	Date Approved By DAS	Item	Item Code	Description of Service/Equipment	Unit	Non-Recurring Monthly Cost	Recurring Monthly Cost
Add	10/01/15	02/10/16	1	OP1MI IFU44	10/100 Base T connection	port/acc	\$0.00	\$480.00
Add	10/01/15	02/10/16	2	OP3MI IFU45	Gigabit Ethernet connection	port/acc	\$0.00	\$720.00
Add	10/01/15	02/10/16	2a		2 mbps CIR (Best Effort)	mbps	\$0.00	\$255.00
Add	10/01/15	02/10/16	2b		2 mbps CIR (Bronze)	mbps	\$0.00	\$300.00
Add	10/01/15	02/10/16	2c	OM007	2 mbps CIR (Silver)	mbps	\$0.00	\$425.00
Add	10/01/15	02/10/16	2d		4 mbps CIR (Best Effort)	mbps	\$0.00	\$295.00
Add	10/01/15	02/10/16	2e	OPT03	4 mbps CIR (Bronze)	mbps	\$0.00	\$350.00
Add	10/01/15	02/10/16	2f	OPT04	4 mbps CIR (Silver)	mbps	\$0.00	\$550.00
Add	10/01/15	02/10/16	3	OP2MI IFU46	5 mbps CIR (Bronze)	mbps	\$0.00	\$380.00
Add	10/01/15	02/10/16	4	OP8MI	5 mbps CIR (Silver)	mbps	\$0.00	\$550.00
Add	10/01/15	02/10/16	4a		8 mbps CIR (Best Effort)	mbps	\$0.00	\$465.00
Add	10/01/15	02/10/16	4b		8 mbps CIR (Bronze)	mbps	\$0.00	\$550.00
Add	10/01/15	02/10/16	4c	OM016	8 mbps CIR (Silver)	mbps	\$0.00	\$635.00
Add	10/01/15	02/10/16	5	OP4MI IFU47	10 mbps CIR (Bronze)	mbps	\$0.00	\$550.00
Add	10/01/15	02/10/16	6		10 mbps CIR (Silver)	mbps	\$0.00	\$720.00
Add	10/01/15	02/10/16	7	OP6MI IFU48	20 mbps CIR (Bronze)	mbps	\$0.00	\$760.00
Add	10/01/15	02/10/16	8	OM006 IFU49	20 mbps CIR (Silver)	mbps	\$0.00	\$930.00
Add	10/01/15	02/10/16	9	OP7MI IFU50	50 mbps CIR (Bronze)	mbps	\$0.00	\$870.00
Add	10/01/15	02/10/16	10	OM001 IFU51	50 mbps CIR (Silver)	mbps	\$0.00	\$1,040.00
Add	10/01/15	02/10/16	11	OP5MI IFU52	100 mbps CIR (Bronze)	mbps	\$0.00	\$1,020.00
Add	10/01/15	02/10/16	12	OM003	100 mbps CIR (Silver)	mbps	\$0.00	\$1,190.00
Add	10/01/15	02/10/16	12a		150 mbps CIR (Bronze)	mbps	\$0.00	\$1,160.00
Add	10/01/15	02/10/16	12b		150 mbps CIR (Silver)	mbps	\$0.00	\$1,500.00
Add	10/01/15	02/10/16	13	OM004 IFU53	250 mbps CIR (Bronze)	mbps	\$0.00	\$1,330.00
Add	10/01/15	02/10/16	14	OM015	250 mbps CIR (Silver)	mbps	\$0.00	\$1,670.00
Add	10/01/15	02/10/16	15	IFU54	500 mpbs CIR (Bronze)	mbps	\$0.00	\$1,610.00
Add	10/01/15	02/10/16	16	OM013	500 mbps CIR (Silver)	mbps	\$0.00	\$1,950.00
Add	10/01/15	02/10/16	16a		600 mbps CIR (Bronze)	mbps	\$0.00	\$1,890.00
Add	10/01/15	02/10/16	16b		600 mbps CIR (Silver)	mbps	\$0.00	\$2,230.00
Add	10/01/15	02/10/16	17	OP9MI IFU55	1000 mbps CIR (Bronze)	mbps	\$0.00	\$2,180.00
Add	10/01/15	02/10/16	18		1000 mpbs CIR (Silver)	mbps	\$0.00	\$2,520.00
Add	10/01/15	02/10/16	19	OMAC1 OM019	Additional MAC add 51-100	add	\$0.00	\$5.00
Add	10/01/15	02/10/16	20	RPE07	Repeater	loc	\$0.00	\$300.00
Add	10/01/15	02/10/16	21		Service order change	order	\$75.00	\$0.00
Add	10/01/15	02/10/16	22		Service order cancellation	order	\$200.00	\$0.00
Add	10/01/15	02/10/16	23		Expedite charge	port	\$300.00	\$0.00

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Add	10/01/15	02/10/16	24		Gigabit Ethernet connect-Special Arrngmt Judicial Data Ctr 101 E River Dr, E Hfd (ICB 149786) see Note1	port/acc	\$0.00	\$600.00
Add	10/01/15	02/10/16	25	IEV52	TSP Priority Installation	port/ acc	\$113.59	\$0.00
Add	10/01/15	02/10/16	26	IEV53	TSP Priority Restoration	port/acc	\$101.82	\$0.00
Add	10/01/15	02/10/16	27	IEV54	TSP Priority Restoration change level	port/acc	\$6.47	\$0.00
Add	10/01/15	02/10/16	28	IEV55	TSP Priority Restoration maintenance	port/acc	\$0.00	\$8.82
Add	10/01/15	02/10/16	29		Fiber DMARC at DSS, 370 James St, New Haven for OPT-E-MAN: TSR 2019-2013 Cost Breakdown is: Engineering Cost: \$1,339.46 Construction Cost: \$3,859.00 Material Cost: \$257.89	Project	\$5,456.35	\$0.00

Note 1: Special arrangement for 1 Gigabit connection with <100 Mbps bandwidth with Fiber Handoff

NOTE: Grey highlighted items are no longer available. They have been either deleted, changed, and/or no longer apply.