

## ETHERNET PRIVATE LINE SERVICE TECHNICAL DESCRIPTION

### Service Description

123Net's Ethernet Private Line (EPL) Service is a reliable, more flexible, higher bandwidth alternative to traditional TDM Private Lines. EPL service enables customers to connect their Customer Edge (CE) using a lower cost Ethernet interface. EPL service enables customers to use any VLANs or Ethernet control protocol across the service without coordination with 123Net.

EPL service provides one Ethernet Virtual Connection (EVC) between two customer locations. EPL offers two Classes of Service (CoS): Priority and Premium. CoS options enable customers to select the CoS that best meets their applications' performance requirements. EPL service is offered with 10Mbps, 100Mbps, 1Gbps or 10Gbps Ethernet User-to-Network Interfaces (UNI) and is available in speed increments from 10Mbps to 10Gbps.

### Section 1. Technical Specifications

#### 1.1 Ethernet User-to-Network Interface.

The service provides bidirectional, full duplex transmission of Ethernet frames using a standard IEEE 802.3 Ethernet interface. Figure 1 lists the available UNI physical interfaces, their associated Committed Information Rate (CIR) bandwidth increments and the Committed Burst Sizes (CBS).

UNI Speed	UNI Physical Interface	CIR Increments	CBS (bytes)
10Mbps	10BaseT	10Mbps	250,000
1Gbps	1000BaseT or 1000BaseSX	100Mbps	2,500,000
		1000Mbps	25,000,000
10Gbps	10GBASE-SR or 10GBASE-LR	10000Mbps	25,000,000

Figure 1: Available UNI interface types and CBS values for different CIR increments

#### 1.2 Class of Service Options.

The service offers two CoS options. The CoS options allow for differentiated service performance levels for different types of network traffic. It is used to prioritize customer mission-critical traffic over lesser priority traffic in the network. The customer must specify a CIR for each CoS to indicate how much bandwidth should be assigned to it. Figure 2 lists the service performance objectives associated with On-Net (for distances within 250 network miles) and Off-Net Services. Only Priority CoS are permissible for On-Net Services. Locations delivered via Off-Net Services will only guarantee the CoS value for the On-Net portion of the service. However, the end-to-end service will honor the committed performance tier metrics.

Performance Objective	Class of Service ( CoS )	
	Premium	Priority
<b>On-Net Services ( &lt;250 miles )</b>		
Latency (one way)	<12ms	<23ms
Jitter (one way)	<2ms	<10ms
Packet Loss (one way)	<0.001%	<0.01%
Availability (On-Net Services delivered via Fiber)	>99.99%	>99.99%
Availability (On-Net Services delivered via HFC Network)	Not Applicable	99.9%
<b>Off-Net Services delivered via Fiber</b>		
Availability	>99.95%	>99.95%

Figure 2: CoS Performance Objectives

#### 1.3 CoS Identification and Marketing.

Customers must mark all packets using 802.1p CoS values as specified in Figure 3 to ensure the service will provide the intended CoS performance objectives specified in Figure 2.

CoS	801.1p
Premium	5
Priority	2-3

Figure 3: CoS Marketing

#### 1.4 Traffic Management.

123Net's network traffic-policing policies restrict traffic flows to the subscribed CIR for each service class. If the customer- transmitted bandwidth rate for any CoS exceeds the subscription rate (CIR) and burst size (CBS), 123Net will discard the non-conformant packets. For packets marked with a non-conformant CoS marking, the service will transmit them using the Priority service class without altering the customer's CoS markings.

#### 1.5 Maximum Frame Size.

The service supports a Maximum Transmission Unit (MTU) packet size of 9100 bytes to support untagged or 802.1Q tagged packet sizes.

#### 1.6 VLAN Tag Preservation.

The service supports IEEE 802.1Q VLAN-tagged customer packets. All customer VLAN IDs and priority code points (IEEE 802.1p) for CoS are transmitted and received unaltered by the service. Untagged packets are mapped to the native VLAN specified by customer. Customers may configure their own VLANs on their customer owned CE without coordination with 123Net. 123Net may reserve one VLAN for network management purposes.

#### 1.7 Ethernet Service Frame Disposition.

The service delivers all service frames associated with the EVC unconditionally across the network as specified in Figure 4.

Service Frame Type	Service Frame Delivery
Unicast	All frames delivered unconditionally
Multicast	All frames delivered unconditionally
Broadcast	All frames delivered unconditionally

Figure 4: Service Frame Delivery Disposition

#### 1.8 Layer 2 Control Protocol (L2CP) Processing.

Refer to Figure 5 for 123Net's L2CP disposition. For L2CPs with multiple disposition possibilities, the customer must specify to 123Net which disposition should be taken. The default disposition is to tunnel these L2CP serviceframes.

Destination MAC Address	Layer 2 Control Protocol	L2CP Frame Disposition
01-80-C2-00-00-00	STP,RSTP,MSTP	Tunnel (All UNIs)
01-80-C2-00-00-01	Pause	Tunnel (All UNIs)
01-80-C2-00-00-02	LACP, LAMP	Tunnel (All UNIs)
01-80-C2-00-00-02	Link OAM	Tunnel (All UNIs)
01-80-C2-00-00-03	802.1X	Tunnel (All UNIs)
01-80-C2-00-00-07	E-LMI	Tunnel (All UNIs)
01-80-C2-00-00-0E	LLDP	Tunnel (All UNIs)
01-80-C2-00-00-20 through 01-80-C2-00-00-2F	GARP, MRP	Tunnel (All UNIs)

Figure 5: L2CP Frame Disposition

## Section 2. Monitoring, Technical Support and Maintenance

### 2.1 Network Monitoring.

123Net monitors all 123Net Services purchased by a customer on a 24x7x365 basis. bandwidth increments and the Committed Burst Sizes (CBS).

### 2.2 Technical Support.

123Net provides customers a toll-free trouble reporting telephone number to the customer Network Operations Center (NOC) that operates on a 24x7x365 basis. 123Net provides technical support for service-related inquiries. Technical support will not offer consulting or advice on issues relating to CE not provided by 123Net.

### 2.3 Escalation.

Reported troubles are escalated within the 123Net NOC to meet the standard restoration interval described in the Service Level Objectives. Troubles are escalated within the 123Net NOC as follows: Supervisor at the end of the standard interval plus one hour; to the Manager at the end of the standard interval plus two hours, and to the Director at the end of the standard interval plus four hours.

### 2.4 Maintenance.

123Net's standard maintenance window is Sunday to Saturday from 12:00am to 6:00am local time. Scheduled maintenance is performed during the maintenance window and will be coordinated between 123Net and the customer. 123Net provides a minimum of forty-eight (48) hour notice for non-service impacting scheduled maintenance. 123Net provides a minimum of seven (7) days notice for service impacting planned maintenance. Emergency maintenance is performed as needed.

## Section 3. Service Level Objectives

123Net provides Service Level Objectives for the service, including network availability, mean time to respond, and mean time to restore. The service objectives are measured monthly from the 123Net point of demarcation.

### 3.1 Availability.

Availability is a measurement of the percentage of total time that the service is operational when measured over a 30 day period. Service is considered "inoperative" when either of the following occurs: (i) there is a total loss of signal for the service, (ii) output signal presented to the customer by 123Net does not conform to the technical specifications in Section 1.

### 3.2 Mean Time to Respond.

Mean Time to Respond is the average time required for the NOC to begin troubleshooting a reported fault. The Mean Time to Respond objective is fifteen (15) minutes upon receipt of a fault notification or from the time a trouble ticket is opened with the NOC.

### 3.3 Mean Time to Restore.

Mean Time to Restore is the average time required to restore service to an operational condition as defined by the technical specifications in Section 1 of this document. The Mean Time to Restore objective is four (4) hours for electronic equipment failure or six (6) hours for fiber optic facilities failure from the time a trouble ticket is opened with the NOC.

## Section 4. Customer Responsibilities

123Net provides CE for provisioning its services and the delivery of the UNI. 123Net will retain ownership and management responsibility for this CE. As a result, the CE must only be used for delivering 123Net services. Customers are required to shape their egress traffic to the contracted CIR.

### Customers have the following responsibilities related to the installation, support, and maintenance of the Service.

- 4.1 Provide an operating environment with temperatures not below fifty-five (55) or above eighty-five (85) degrees Fahrenheit. Humidity shall not exceed ninety (90) percent at eighty-five (85) degrees Fahrenheit.
- 4.2 Provide secure space sufficient for access to one (1) standard, freestanding, equipment cabinet at each of the customer facilities, no further than fifty feet from the customer router or switch interface.
- 4.3 Provide outside cable entry conduit(s), entry cable ground point, and internal building conduit to allow 123Net the ability to rod/rope a fiber optic cable to the point of demarcation.
- 4.4 Locate and mark all private underground utilities (Water, Electric, etc.) along path of new underground placement not covered by utility companies.
- 4.5 Provide a pull rope in any existing duct that 123Net is to use and ensure existing duct is serviceable for 123Net use.
- 4.6 Obtain 'right-of-way' entry easement for 123Net facilities and equipment from property owners at each customer location.
- 4.7 Provide access to the buildings and point of demarcation at each customer location to allow 123Net and its approved Contractors to install fiber for service installation. Provide access to each location for regular (8am - 5pm) and emergency (24 hour) service and maintenance of 123Net's equipment and facilities.
- 4.8 Provide, install and maintain a device that is capable of routing network traffic between the Service and the customer's Local Area Network (LAN).
- 4.9 Customer must provide a point of contact for installation, service activation, and any maintenance activities.

## Section 5. Definitions

### 5.1 Latency.

Latency, also known as Frame Delay, is defined as the maximum delay measured for the portion of successfully delivered service frames over a time interval

### 5.2 Jitter.

Jitter, also known as Frame Delay Variation, is defined as the short-term variations measured for a portion of successfully delivered service frames over a time interval.

### 5.3 Packet Loss.

Packet Loss, also known as Frame Loss, is the difference between the number of services frames transmitted at the ingress UNI and the total number of service frames received at the egress UNI.