



# L2CONNECT 2.0 E-ACCESS

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## SERVICE OVERVIEW

**L2Connect 2.0 E-Access services (E-Access)** provides a single point of access to Service Providers looking for off-net 'B'- end Ethernet access services in Romania and across the SEE region, allowing them to rapidly increase their service, offering an extensive connectivity solutions beyond their network boundaries.

The wholesale E-Access service offered by Telekom Romania provides a point-to-point Operator Virtual Connection (OVC) between the interconnection point (the ENNI) established with the Service Provider, and any customer location covered by Telekom Romania's service footprint (the UNI).

Through this service, the Service Providers may easily deliver their customers a large number of end-to-end EPL and EVPL services across multiple networks operated by different entities. The ENNI supports multiplexed Access EPLs and/or Access EVPLs on a single interface, is available as a 1 Gbps or 10 Gbps Ethernet port and may be ordered as a single or dual hand-off. Telekom Romania will install a Network Interface Device at the premises of each UNI.

The E-Access includes two of most popular types of point-to-point Ethernet Access services: **Access EPL** and **Access EVPL**.

The terminology and service options comply with the MEF standards.

## CUSTOMER BENEFITS

- **Flexibility** - designed to tailor various requirements, allows to easily increase capacity, add new locations or choose among different levels of service performance and service management.
  - **Transparency** - provides the same service features all across the network footprint.
  - **Reliability** - is built on a redundant and fault tolerant backbone and designed for congestion avoidance.
  - **Strong SLAs** - is complemented with two service levels, tailored to different needs: Standard and Premium, with an availability goal of 100%.
  - **Easy integration with operators** offering services certified CE 2.0 MEF.
- A number of supplementary features enhance the service benefits such as CPE packages, engineering services and other more.

## ACCESS EPL

The Access EPL provides a point-to-point E-Access service, whereby a single port-based connection (OVC) is delivered at the customer location endpoint, on a dedicated UNI endpoint.

The service features a high degree of transparency, allowing customers to use any customer VLANs or Ethernet control protocol across the service, without needing any coordination with Telekom Romania.

The Service offers four Classes of Service (CoS) to choose from, enabling selection of CoS that best meets the customer requirements. The service is offered with 10Mbps, 100 Mbps or 1 Gbps Ethernet interface (User-to-Network Interface), being available in speeds increments from 1 Mbps to 1 Gbps.

The Service Provider and Telekom Romania have to coordinate the value of S-VLAN ID at the ENNI.

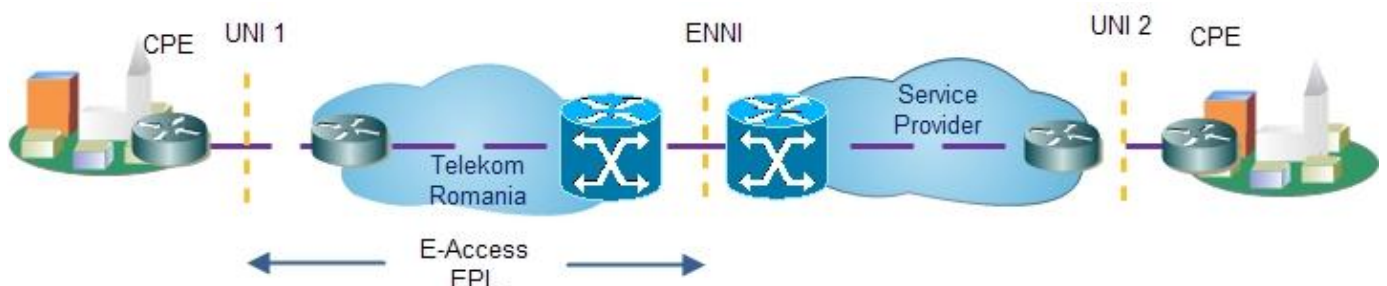


Fig. 1 – E-Access EPL service

## ACCESS EVPL

The Access EVPL provides a point-to-point E-Access service, whereby **multiple** OVC services may be delivered at customer's location endpoint per VLAN basis (multiplexed UNI endpoint), including a mix of E-Access and EVC Services.

The service is similar to Access EPL, additionally supporting the flexibility to multiplex more services (OVCs) on a single UNI at a customer aggregation/hub site.

Access EVPL offers four Classes of Service (CoS) to choose from, enabling Service Providers to select the CoS that best meets their requirements. The service is offered with 10 Mbps, 100 Mbps or 1 Gbps Ethernet interface (User-to-Network Interface), being available in speeds increments from 1 Mbps to 1 Gbps.

The Service Provider has the responsibility to coordinate with the customer to name which service frames at the UNI are mapped to each OVC.

The Service Provider and Telekom Romania must coordinate the value of S-VLAN ID at the ENNI.

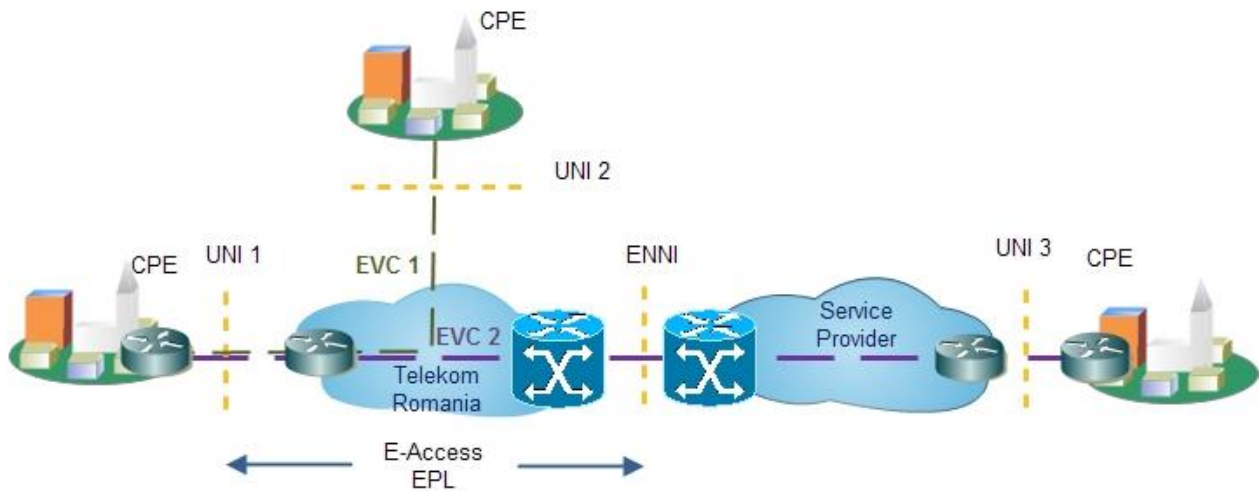


Fig 2 – E-Access EVPL service

## SERVICE ATTRIBUTES

### 1. ETHERNET USER-TO-NETWORK INTERFACE

The E-Access service provides bidirectional, full duplex transmission of Ethernet frames using a standard Ethernet interface (UNI).

### 2. SERVICE MAXIMUM FRAME SIZE

The service delivers a default Maximum Transmission Unit packet size of 1526 bytes, supporting customer untagged and single tagged (802.1q) traffic. Other higher MTUs may be supported case-by-case.

### 3. SERVICE MULTIPLEXING AT UNI

Using Service Multiplexing, multiple instances of Point-to-Point OVCs may be delivered at the same customer location without requiring different physical ports on the UNI. The maximum standard number of OVC service instances allowed on the UNI for the EVPL configurations depends on service bandwidth, with values in range from 2 to 20.

A charge will be applied for a request of an additional OVC per UNI.

**Note:** When service multiplexing is used, the sum of CIR should not exceed the UNI port bandwidth.

### 4. STANDARD MAC ADDRESS NUMBER

The maximum MAC address depends on the port speed, with values in range from 100 to 200.

## 5. CLASS OF SERVICE

### CLASS OF SERVICE (COS) POLICY

E-Access service provides four classes of services, to prioritize customer mission-critical applications' traffic from other categories of traffic in the network:

- **Best effort** - E-mail, Intranet, Internet, other applications that can accommodate variable throughput delay
- **Standard** – standard business applications, e.g. short transactions, SAP, ERP, Oracle, video streaming, network services requesting guaranteed bandwidth
- **Mission Critical** – business critical applications – transactional information, highly interactive, highly sensitive to delay (e.g. signaling, banking application)
- **Real time** – suitable for strong interactive, real time applications (VoIP, Videoconference, signaling).

The Real Time service bandwidth is limited up to 10 Mbps per service location. The Mission Critical service bandwidth is limited up to 100 Mbps per service location.

At each service end points, UNI and ENNI, the Service Provider may choose a single CoS for each service instance of OVC traffic that will be mapped to.

#### CoS classification and marking

Inside Telekom Romania network, the CoS value of the 802.1p bits will be marked according to the company's CoS policy.

**Class of Service Identifier** may be based on one of the following exclusive methods:

1. OVC End Point value
2. PCP value in the C-Tag mapped to OVC End Point

## 6. TRAFFIC MANAGEMENT

For each OVC service instance, the traffic flow is restricted to the subscriber CIR.

## 7. BANDWIDTH PROFILE

The CE is expected to shape traffic to the Ingress Bandwidth Profile of the service.

The table below itemizes the available bandwidth profiles for Real Time, Mission Critical and Standard Class. For Best effort class, the CIR is equal to 0, EIR higher than 0, value up to contracted bandwidth.

	CIR Range	CIR Increment	CBS [ bytes]
Access EPL/ EVPL	1 Mbps – 10 Mbps	1 Mbps	32,000
	10 Mbps – 100 Mbps	10 Mbps	320,000
	100 Mbps – 1 Gbps	100 Mbps	3,200,000
	1 Gbps – 10 Gbps	1 Gbps	32,000,000
	EIR=0; EBS=0; CF=0, Color Mode = blind at UNI; Color Mode=Aware at ENNI; CIR <= 70% of UNI speed		

Table 1 – Ingress bandwidth profile

## 8. VLAN TAG PRESERVATION

The E-Access service, EPL and EVPL, transmits transparently all Customer VLAN IDs and the PCP bits (802.1p bits) compliant the C-VLAN/OVC and CoS mapping, without alteration.

In case of E-Access EVPL, the Service Provider must coordinate with Telekom Romania adding / moving / deleting C-VLANs.

## 9. ETHERNET SERVICE FRAMES DISPOSITION

For Access EPL, all service frames are delivered unconditionally by Telekom Romania. For Access EVPL, all Multicast/ Broadcast frames are provided conditionally through the network, as follows:



Multicast Frames: Limited to 20% of the UNI bandwidth. Upon request may be delivered unconditionally, subject to a preliminary feasibility study  
 Broadcast Frames: Limited to 1% of the UNI bandwidth.

## 10. PROTECTION

The protection mechanisms offered by Telekom Romania address port and service protection, and can include:

- UNI port protection
- ENNI port protection
- UNI-ENNI OVC

End-to-end path protection (EVC) – providing a redundant end-to-end path for the primary path.

## 11. SERVICE OAM FAULT MANAGEMENT (SOAM-FM)

The Access EPL and Access EVPL Services will tunnel all SOAM frames at the default Test and Subscriber MEG levels.

## 12. SERVICE LEVEL AGREEMENT

Telekom Romania offers differentiated service performance based on class of service and the type of SLA - Standard for unprotected services and Premium for protected.

Performance Tier	CoS	One-way Frame Delay	One-way Frame Loss Ratio	Inter-Frame Delay Variation
Metro (*<250km)	Real Time	< 10 ms	< 0,01%	< 3 ms
	Mission Critical	< 20 ms	< 0,01%	< 8 ms
	Standard	< 37 ms	< 0,1%	NA
	Best Effort	NA	NA	NA
Regional (*<1200km)	Real Time	< 25 ms	< 0,01%	< 7 ms
	Mission Critical	< 78 ms	< 0,01%	< 40 ms
	Standard	< 125 ms	< 0,1%	NA
	Best Effort	NA	NA	NA
Continental (*<7000km)	Real Time	< 77 ms	<0,025%	< 7 ms
	Mission Critical	< 115 ms	<0,025%	< 40 ms
	Standard	< 230 ms	< 0,1%	NA
	Best Effort	NA	NA	NA

Table 2 – Service Level Agreement

## 13. L2CP PROCESSING

Processing of L2CP frames is agreed to by the two parties involved in the Access Service.

## ABBREVIATIONS

CoS	Class of Service
ENNI	External Network-to-Network interface
EPL	Ethernet Private Line
EVC	Ethernet Virtual Connection
EVPL	Ethernet Virtual Private Line
L2CP	Layer 2 Control Protocol
MAC	Media Access Control
MTU	Maximum Transmission Unit
OVC	Operator Virtual Connection
UNI	User Network Interface
VLAN	Virtual LAN





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