

**REALTELECOM's** Guide to  
REAL Ethernet Business Services

Reliable. Economical. Accountable. Limitless.

**REALTELECOM**

## Dear Ethernet Service Provider,

Like many carriers, you are planning to offer new Ethernet services to both your business customers and your network partners. Over the past few years, RAD Data Communications has helped numerous operators roll out MEF-certified EPL and EVPL services. Now we would like to share with you the experience we have gained in defining the essential building blocks of new Layer 2 Ethernet service offerings.

This brochure simulates the Ethernet service model of a hypothetical carrier named REAL TELECOM. We hope you will find it useful for your new Ethernet service launch.

**RAD Data Communications**

REAL TELECOM's Layer 2 Ethernet business solutions are designed to converge all your communications services over a simplified, cost-effective network.

Offering extensive nationwide and regional coverage, scalable pricing and granular bandwidth rates up to 1 Gbps, REAL TELECOM's Ethernet business services allow you to grow your bandwidth at your own pace or add locations as needed without service disruptions. With REAL TELECOM's fully managed, end-to-end quality of service you can now enjoy first-rate Ethernet-based voice and data services while reducing your operating expenses. In addition, REAL TELECOM's high-capacity Ethernet transport services allow you to extend your network reach across any distance. Our flexible service offering supports point-to-point or any-to-any connectivity over any available access link, whether fiber, copper circuits or business-grade, symmetrical DSL.

Wherever you are, whatever your network requirements may be – stay connected and remain competitive with Ethernet business solutions that are REAL: Reliable, Economical, Accountable, and Limitless.



## REAL TELECOM offers two types of Ethernet business services – REAL Ethernet Wholesale and REAL Ethernet Enterprise:

### ► REAL Ethernet Wholesale Services

REAL Ethernet wholesale services are available to service providers and operators based on the following pricing model:

	Bandwidth	Access Distance	End-to-End Coverage	Class of Service
Connection	1 -1,000 Mbps	Metro/Region	---	---
Service	1 -1,000 Mbps	---	Regional/National	Standard/ Priority/ Real Time

The access line to the user premises (“Connection”) is charged according to location and bandwidth rate. Service fees (“Service”) are charged per bandwidth, service reach and class of service (CoS). For wholesale Ethernet transport services, only Connection charges apply.

### ► REAL Ethernet Enterprise Services

REAL Ethernet Enterprise Services are available to organizations with private networks and include Connection and Service charges. Examples of **REAL Ethernet applications and services for enterprises** are listed on the right:

- Point-to-point private lines
- Transparent LAN services
- Layer 2 VPNs
- IP telephony and video conferencing
- TDM voice
- Rich-media file transfer
- Mission-critical applications
- Remote backup
- Archiving and storage
- Database sharing
- Centralized servers
- Branch reporting
- Business continuity

## Why Layer 2 Services?

- Full transparency
- Routing control by users
- Compatibility with any Layer 3 application
- Easy link additions, changes or upgrades
- Simplified management

# Compelling Benefits

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## Reliable

- Resilient, "always-on" connections featuring four nines or five nines availability
- 24/7 end-to-end network management
- Automatic fault isolation and quick troubleshooting
- Minimal service disruptions through advanced link protection schemes
- Quality of service (QoS) priority guarantees per class of service (CoS)

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## Economical

- Cost-effective customer located equipment
- Lower expenditures on multi-site connectivity
- High throughput without heavy investments in infrastructure and equipment
- Flexible and scalable data rates, provisioned remotely
- Minimal down-time for servicing and repair

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## Accountable

- Service level agreements (SLA)-based performance commitments
- Clear network visibility, proactive service monitoring

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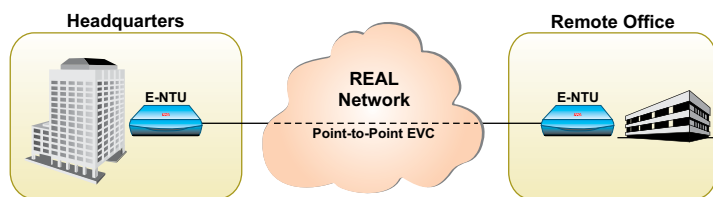
## Limitless

- Data rates from 1 Mbps to 1 Gbps
  - Consistent service over any infrastructure
  - Versatile connectivity options, customized services
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## Feature Highlights

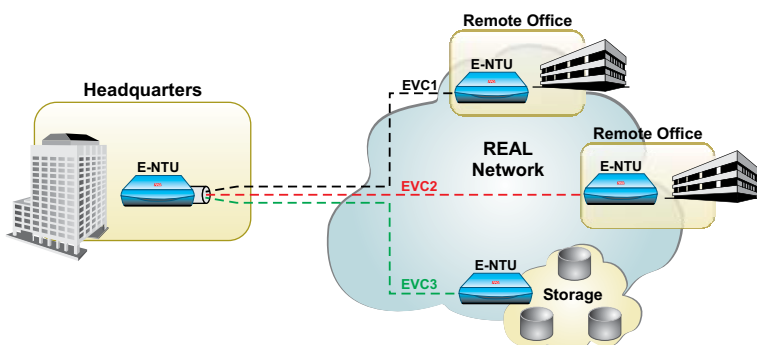
- Granular data rates up to 1 Gbps for WAN connections
- IEEE 802.3-compliant interfaces
- Fully transparent services using VLAN stacking (Q-in-Q)
- Ethernet private line (EPL), Ethernet virtual private line (EVPL) and E-LAN services
- Preservation of LAN traffic priorities in the WAN
- Hitless link restoration to minimize service disruptions
- Periodic performance reporting

# Connectivity Options



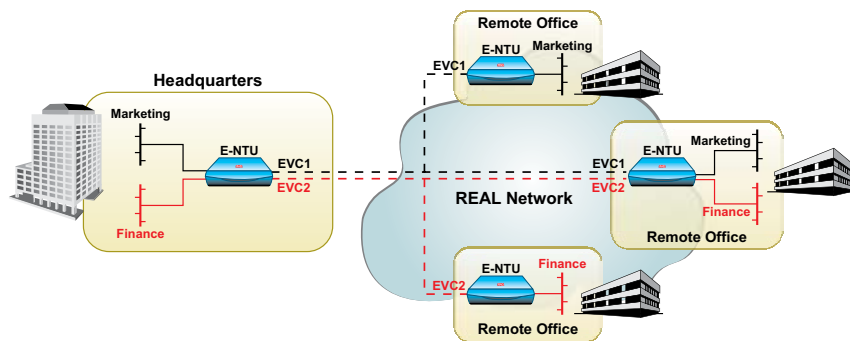
## E-Line: Ethernet Private Line (EPL)

- Point-to-point, high-speed transport service across REAL TELECOM's metro or wide area networks
- Fully managed; Dedicated leased line security
- Fixed-bandwidth Ethernet virtual connection (EVC) per physical user interface



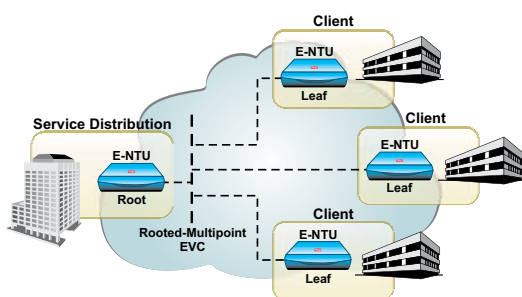
## E-Line: Ethernet Virtual Private Line (EVPL)

- Multiple point-to-point EVCs per user port
- Access connection supports several services simultaneously
- Individual delivery priorities per service
- "Scale as you Grow" flexibility: Incremental bandwidth and EVC additions as needed, up to the maximum access link rate



## E-LAN: Ethernet Private LAN (EPLAN) and Ethernet Virtual Private LAN (EVPLAN)

- Multipoint, any-to-any connectivity between disparate locations
- High performance, bandwidth granularity and differentiated classes of service
- Ideal for transparent LAN networking



## E-Tree

- Multicast, rooted-multipoint service
- Ideal for IPTV service provisioning

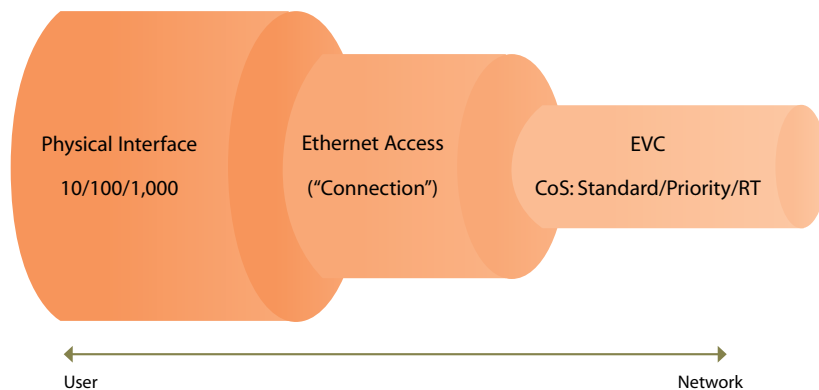
# Service Classes and Performance

## Classes of Service and Bandwidth Rates

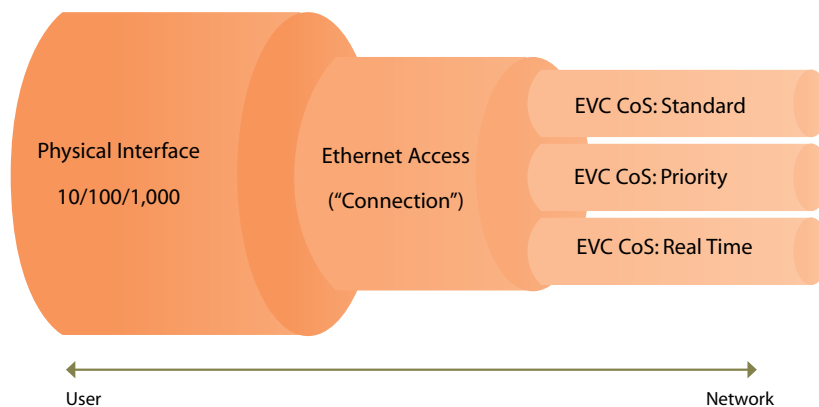
Real Ethernet business solutions support service differentiation and traffic prioritization for up to eight classes of service (CoS). A three-CoS package, for example, includes the following:

<b>Standard:</b>	For applications with no particular performance requirements with regards to frame delivery and delay, e.g. Internet access
<b>Priority:</b>	For applications requiring data delivery guarantees
<b>Real Time:</b>	For delay-sensitive services such as voice and video, with stringent performance requirements

### EPL/EPLAN: Single CoS per Connection



### EVPL/EVPLAN: Multiple CoS per Connection

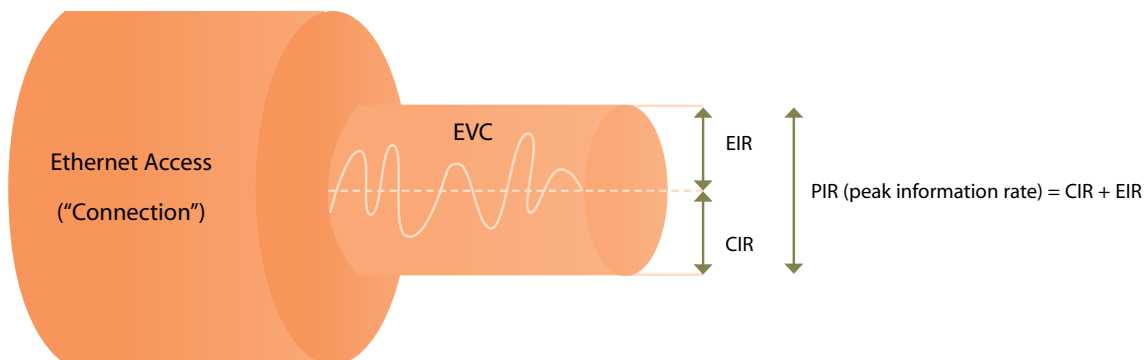


Service	Network Access	Bandwidth*	Bandwidth Provisioning
EPL/EPLAN	PDH	1 Mbps-1 GbE	Per Ethernet Connection
	SDH		
EVPL/EVPLAN	DSL	1-10 Mbps in 1 Mbps increments	Per EVC.CoS
	FE/GbE	10-100 Mbps in 10 Mbps increments	
		100-1,000 Mbps in 100 Mbps increments	

\* Specific bandwidth offering depends on available network access in specific locations

## Performance Guarantees

REAL TELECOM applies sophisticated OAM (operation, administration and maintenance) diagnostics and advanced traffic management techniques to ensure that SLA guarantees are met with respect to network availability and per-service connectivity rates. Each service is assigned traffic profile parameters, namely committed information rate (CIR) and excess information rate (EIR). User traffic complying with the CIR is guaranteed delivery as per the service values below. User traffic within the EIR range is admitted to the network on a "best effort" basis, as per the service values below:



### Typical CIR/EIR Values

Service Class	CIR	EIR
Standard	10%	90%
Priority	50%	50%
Real Time	90%	10%

Total PIR values can be upgraded up to the bandwidth limit of the user port. Available bandwidth rates include all Ethernet headers and user/service VLAN ID tags.

# Service Level Agreements

REAL TELECOM offers detailed, measurable and enforceable SLAs per Ethernet connection and per class of service. The SLAs detail guaranteed bandwidth profiles per EVC and service performance attributes, including committed values for frame loss, frame delay and delay variation. Below is an example of REAL TELECOM's assured connectivity and performance parameters:

## Access Connection

UNI (physical interface) Service Attribute	Parameter Values
Speed (Mbps)	10/100/1000
Transmission Mode	Full Duplex
MAC Layer	IEEE 802.3
Service Multiplexing	Yes/No
MAC Address Table Size	----
VLAN ID Range	----

## Service

EVC Service Attribute	Parameter Values		
	Standard	Priority	Real Time
EVC Type (Point-to-point/Multipoint)			
CE-VLAN ID Preservation – IEEE 802.1Q (Yes/No)			
CE-CoS Preservation – IEEE 802.1p (Yes/No)			
Unicast Service Frame Delivery (Conditionally/Unconditionally)			
Multicast Service Frame Delivery (Conditionally/Unconditionally)			
Broadcast Service Frame Delivery (Conditionally/Unconditionally)			
Frame Loss <ul style="list-style-type: none"> <li>Value (%)</li> <li>Direction (Round-trip/ Two-way)</li> <li>Time Interval (Hrs)</li> </ul>			
Frame Delay <ul style="list-style-type: none"> <li>Value (ms)</li> <li>Percentile (%)</li> <li>Direction (Round-trip/ Two-way)</li> <li>Time Interval (Hrs)</li> </ul>			
Frame Delay Variation <ul style="list-style-type: none"> <li>Value (ms)</li> <li>Percentile (%)</li> <li>Direction (Round-trip/ Two-way)</li> <li>Time Interval (Hrs)</li> </ul>			
Restoration Time (sec)			
Max Frame Size (bytes)			
Ingress Bandwidth Profile per EVC or per UNI (%)	CIR: EIR:	CIR: EIR:	CIR: EIR:

Insert Your Values Here!



## Customer Layer 2 Control Protocols

Layer 2 Control Protocol	EPL	EVPL
STP – Spanning Tree Protocol (Tunnel/Discard)	Insert Your Values Here!	
RSTP – Rapid Spanning Tree Protocol (Tunnel/Discard)		
MSTP – Multiple Spanning Tree Protocol (Tunnel/Discard)		
Pause – IEEE 802.3 x (Tunnel/Discard)		
LACP – Link Aggregation Control Protocol (Tunnel/Discard)		
Authentication – IEEE 802.1 x (Tunnel/Discard)		
GARP – Generic Attribute Registration Protocol (Tunnel/Discard)		

REAL TELECOM's Ethernet SLAs also specify customer service response time, maintenance hours and committed network availability per service level:

Service Level Agreement	Service Center Hours	Maintenance Hours	Response Time	Repair Time	Average Network Availability
Standard	Insert Your Values Here!				99.0%
Silver					99.9%
Gold					99.9%
Platinum					99.999%

## Network Access Rates

Network Access	Maximum Available Bandwidth
DSL	22 Mbps
PDH	32 Mbps
Fast Ethernet	100 Mbps
SDH	622 Mbps
Gigabit Ethernet	1,000 Mbps

# RAD Data Communications Ethernet Demarcation Devices



To ensure strict compliance with SLA terms and guarantees, REAL TELECOM deploys RAD's EtherAccess® compact network demarcation devices at the user premises, for advanced service monitoring and remote management. EtherAccess hardware is an integral part of REAL TELECOM's Ethernet services and is owned and operated by REAL TELECOM. All installation and maintenance work is performed only by REAL TELECOM approved technicians.

Ethernet over Fiber | ETX-202, ETX-202A



Ethernet over PDH | RICi-16



Ethernet over DSL | LA-210



Ethernet over SDH | RICi-155GE



Ethernet over SDH | RICi-622GE



Ethernet over TDM | Egate-100



## EtherAccess Product Specifications

### RAD's EtherAccess Fiber Optic EDDs

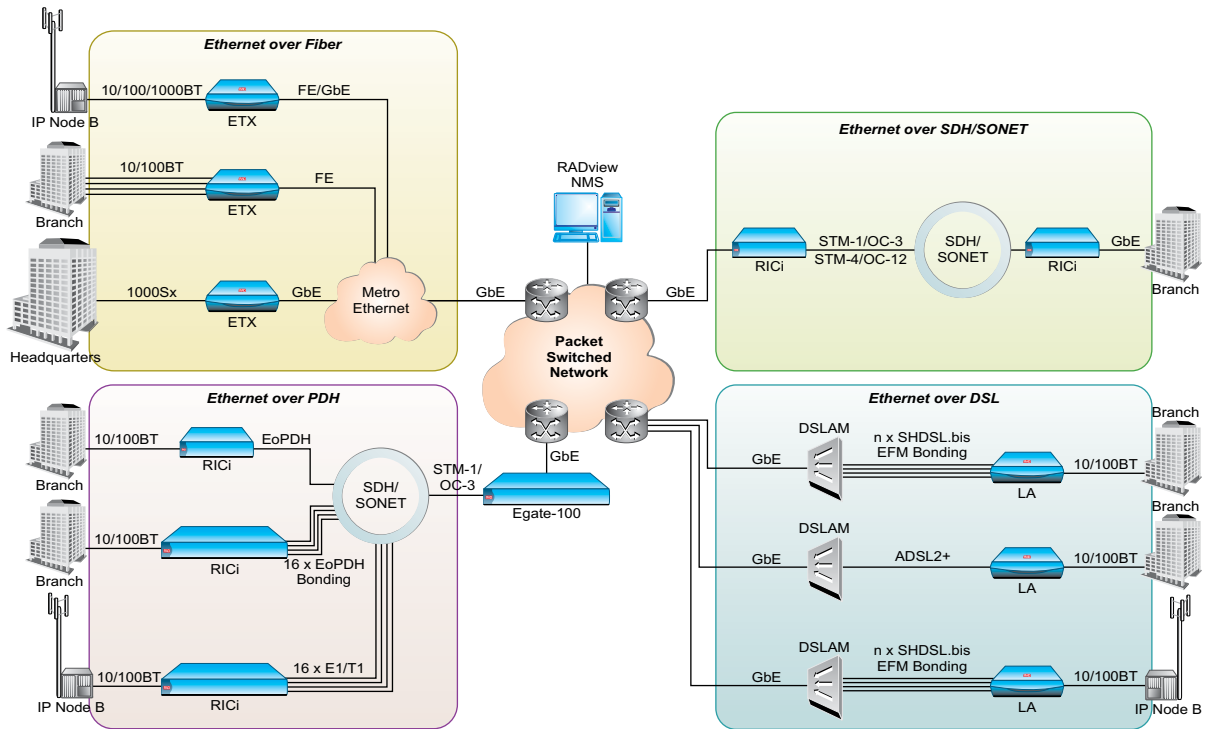
Fiber Demarcation Devices	ETX-202	ETX-202A
User Interface	1000BaseT/Lx/Sx	1000BaseT/Lx/Sx/Bx
Port Count	User: 4 x GbE Network: 2 x GbE (Redundancy)	User: 4 x GbE Network: 2 x GbE (Redundancy)
Class of Service	Strict Priority Up to 3 CoS	Strict Priority/WFQ Up to 8 CoS
Max Power Consumption	9W	18.5W

### RAD's EtherAccess PDH/SDH/SONET EDDs

Copper Demarcation Devices	RICi-16	RICi-155GE
User Interface	10/100BaseT	1000BaseT/Lx/Sx
Port Count	User: 4 x FE Network: 16 x E1/T1 (Bonded/Redundant)	User: 2 x GbE Network: 2 x STM-1/ OC-3 (Bonded/ Redundant)
Class of Service	Strict Priority Up to 4 CoS	Strict Priority Up to 4 CoS
Max Power Consumption	9W	40W



**data communications**  
The Access Company



## RAD's EtherAccess Aggregation Gateways

REAL TELECOM also offers carriers and service providers aggregation gateways for POP and central locations, replacing multi-box SDH routers and converters.

### RAD's EtherAccess DSL EDDs

RICI-622GE	DSL Demarcation Device	LA-210
1000BaseT/Lx/Sx	User Interface	10/100BaseT
User: 2 x GbE	Port Count	User: 4 x FE
Network: 2 x STM-4/ OC-12 (Bonded/ Redundant)		Network: 4 x SHDSL.bis (EFM Bonded/ Redundant)
Strict Priority	Class of Service	Strict Priority/ WFQ
Up to 4 CoS		Up to 4 CoS
40W	Max Power Consumption	6.1W

Aggregation Gateway	Egate-100
Interfaces	Channelized STM-1/OC-3 or DS-3
	1000BaseT/Lx/Sx
Port Count	2 x Ch. STM-1/OC-3 (Redundancy) or 3 x DS-3
	2 x GbE (Redundancy)
Class of Service	Strict Priority
	Up to 4 CoS
Max Power Consumption	40W

[www.ethernetaccess.com](http://www.ethernetaccess.com)



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