TATA COMMUNICATIONS

TATA

NETWORK SERVICES: ETHERNET

WAN ETHERNET SERVICES

PRODUCT PORTFOLIO SUMMARY DOCUMENT

TABLE OF CONTENT

1. Understanding Fundamentals
2. Summary of Tata Products
3. Dedicated Ethernet
4. Low Latency Ethernet
5. Priority Ethernet
6. Priority Stretch
7. Dedicated Multipoint Ethernet
8. Virtual Private LAN Service (VPLS)
9. 10 Gig Ethernet
10. Managed Ethernet Option
11. FAQs
12. WAN Ethernet Coverage
13. Reference Material

© 2017 Tata Communications. All Rights Reserved. TATA COMMUNICATIONS and TATA are trademarks of Tata Sons Limited in certain countries.

Understanding Fundamentals

- Defining the protection types
- Defining CIR
- Defining the MEF service types like EPL, EVPL and EP-LAN etc.
- What are MEF Certifications?

Defining the protection types: Unprotected, Deterministic, and Mesh Protection

Unprotected Circuit – This means that data traveling from Location A to Location Z has only a single defined path and in case of a cable failure along the path there is no second route for the data to reach its destination. Customers often buy two unprotected circuits using different paths and manage their own protection switching.

Deterministic Protection – This means that the service will automatically re-route to a backup path if the primary path fails. 'Deterministic' means that the two paths are clearly defined on specific cable routes and the customer can define which cable systems are used.

Mesh Protection – This means that there are multiple routes available from Location A to Location Z and the data can travel on any of these routes to reach its destination. In case of a failure on one of the routes the data will be re-routed automatically to one of the other available routes and the network alone decides which paths are used.

Defining CIR

CIR is Committed Information Rate. This is the data rate which is guaranteed under the Service Level Agreement i.e., has defined performance criteria. In the case of Tata's dedicated Ethernet product, Tata will reserve this amount of bandwidth on the fibre network for this specific customer. For MPLS-based products, the CIR is shared bandwidth but is capacity managed, with more fibre capacity added to avoid congestion in normal operational conditions.

Defining the MEF service types like EPL, EVPL and EP-LAN etc.

E-Line - Any Ethernet service that is based on a Point-to-Point Ethernet Virtual Connection (EVC) is designated as an Ethernet Line (E-Line) Service type. An E-Line service type can be used to create a broad range of Point-to-Point services.

EPL – An Ethernet Private Line (EPL) service is specified using an E-Line service type. An EPL service uses a Point-to-Point EVC between two physical UNI ports and provides a high degree of transparency for service frames between the UNIs it interconnects such that the service frame's header and payload are identical at both the source and destination UNI when a service frame is delivered.

EVPL - An Ethernet Virtual Private Line (EVPL) is created using an E-Line service type. An EVPL can be used to create services like the Ethernet Private Line (EPL) with some notable exceptions. First, an EVPL allows for service multiplexing at the UNI. This capability allows more than one EVC to be supported at the UNI where the EPL does not allow this. Second, an EVPL need not provide as much transparency of service frames as with an EPL. Because service multiplexing is permitted, some service frames may be sent to one EVC while other service frames may be sent to other EVCs.

E-LAN - Any Ethernet Service that is based upon a Multipoint-to-Multipoint EVC is designated as an Ethernet LAN (E-LAN) Service type so traffic can flow from any site on the network directly to another site on the network.

EP-LAN - Subscribers with multiple sites often want to interconnect them at high speeds so all sites appear to be on the same Local Area Network (LAN) and have equivalent performance and access to resources such as servers and storage. Subscribers commonly desire a highly transparent service that connects multiple UNIs. To this end, the Ethernet Private LAN (EP-LAN) service is defined in this subsection, using the E-LAN service type.

EVP-LAN - Some Subscribers commonly desire an E-LAN service type to connect their UNIs in a metro network, while at the same time accessing other services from one or more of those UNIs. An example of such a UNI is a Subscriber site that wants to access a public or private IP service from a UNI that is also used for E-LAN service among the Subscriber's several metro locations. It is defined as the Ethernet Virtual Private LAN (EVP-LAN) service in this subsection to address this need.

© 2017 Tata Communications. All Rights Reserved. TATA COMMUNICATIONS and TATA are trademarks of Tata Sons Limited in certain countries.

What are MEF Certifications?

Metro Ethernet Forum (MEF) is a global industry alliance comprising more than 210+ organizations including telecommunications service providers, cable MSOs, network equipment/software manufacturers, semiconductors vendors and testing organizations. The MEF develops Carrier Ethernet technical specifications and implementation agreements to promote interoperability and deployment of Carrier Ethernet services and equipment worldwide.
Carrier Ethernet 2.0 (CE2.0) certification represents a significant test of functionality and is driven by the rapidly growing market demand for Ethernet services. CE 2.0 defines five service types – E-Line, E-LAN, E-Tree, E-Access and E-Transit which allow service providers to buy equipment with confidence that they will interwork with existing equipment, and allows their customers to be confident of the behaviour of traffic carried by these service providers.

CE2.0 Certification provides:

- Standardised services
- Defined Qualify of Service
- Enhanced reliability
- Enhanced Scalability
- Enhanced service management

The CE 2.0 certification is the result of rigorous testing by a third party MEF-approved test lab using 634 test cases derived from the MEF specifications for the five CE 2.0 service types – E-Line, E-LAN, E-Tree, E-Access and E-Transit.

Visit www.mef.net to learn more about MEF.

What is Provider Backbone Bridging (PBB)?

Provider Backbone Bridging – This is IEEE 802.1ah standardised technology delivered using Cisco ASR hardware. It was developed specifically to carry Ethernet traffic, and therefore is one generation more advanced than MPLS. Tata Communications is the only carrier offering services based on PBB technology globally.

© 2017 Tata Communications. All Rights Reserved. TATA COMMUNICATIONS and TATA are trademarks of Tata Sons Limited in certain countries.

Summary of Tata Communications' Products

Services	MEF Defined Service	Tata Platform Technology	Protection type	Jumbo Frames	MEF Certified
Global Dedicated Ethernet	EPL	PBB, EoSDH	Deterministic, Ring or unprotected	Yes	Yes
National Dedicated Ethernet	EPL	PBB, EoSDH	Deterministic, Ring, only available in India	Yes	Yes
Low Latency Dedicated Ethernet	EPL	PBB, EoSDH	Unprotected	Yes	Yes
Priority Ethernet (Point to Point)	EVPL	MPLS	Mesh	No	Yes
Priority Ethernet (Point to Multipoint)	EVPL	MPLS	Mesh	No	Yes
10 Gig Ethernet	EPL	Wavelength	Deterministic, Ring or unprotected	Yes	No
Global Priority Stretch Ethernet	EPL	IP	Mesh	Mesh	No
Dedicated Multipoint	EP-LAN	PBB, EoSDH	Deterministic, Ring or unprotected	Yes	Yes
Virtual Private LAN Service	EP-LAN	MPLS	Mesh	No	Yes

© 2017 Tata Communications. All Rights Reserved. TATA COMMUNICATIONS and TATA are trademarks of Tata Sons Limited in certain countries.

Dedicated Ethernet – Global & National (GDE & NDE)

Service Details

- Dedicated, high performance Ethernet to locations spanning the globe
- Uses state-of-the-art PBB technology platform providing the highest levels of transparency to protocols, MAC (Ethernet) addresses and VLANs
- Flexible bandwidth options, from 2Mb to 7.5Gb
- Bandwidth upgrades with no downtime or contract renewals
- Aggressive service level guarantees
- MEF CE2.0 certified

Feature	Details
Choice of bandwidth	2-100 Mb in 2 Mb increments 50 – 1,000 Meg in 50 Meg increments 1000—10,000 Meg in 500 Meg increments
Committed bandwidth	Full bandwidth is treated as Committed Information Rate (CIR) as this is a dedicated service.
Choice of interface handoffs	**Fast-E interfaces:** 10BaseTx (copper, RJ45, full duplex) 100BaseTx (copper, RJ45, full duplex) 100BaseFx (fiber, SM/MM 1310nm, full duplex) **Gig-E interface:** 1000BaseLX (fiber, SM, 1310nm, full duplex) 1000BaseSX (fiber, MM, 850nm, full duplex) 1000BaseTx (copper, RJ45, full duplex) **10 Gig Interface:** **10GE WAN PHY:** 10Gbase SW: 850nm, multimode, 26m-300m 10Gbase LW: 1310nm, single mode, 2m-10km 10Gbase EW: 1550nm, single mode, 30-40km **10GE LAN PHY:** **10Gbase SR:** 850nm, multimode, 26-300m 10Gbase LR: 1310nm, single mode, 2m-10km 10Gbase ER: 1550nm, single mode, 30-40km
Choice of interface handoffs	No deep packet inspection, no MAC learning and no VLAN forwarding required.
Transparent pipes	Standard frame sizes (64-1522) and jumbo frame sizes (9000 bytes) on request.
Choice of frame sizes	Bandwidth can be upgraded on existing ports without service interruption.
Non-service-affecting upgrades	**GDE:** Installation, Availability, Mean Time to Repair, Latency/Frame Delay, Packet Delivery Ratio
Service Level Agreements (SLAs)	**NDE:** Installation, Availability, Mean Time to Repair
MEF Certifications	CE2.0

© 2017 Tata Communications. All Rights Reserved. TATA COMMUNICATIONS and TATA are trademarks of Tata Sons Limited in certain countries.

Low Latency Dedicated Ethernet (LOLA)

Service Details

- Connecting the most important economic centres in the world with low latency connections
- Tata network equipment installed directly in many stock exchanges
- Ideal for financial trading organisations or any business seeking a fast path between major cities
- Flexible bandwidth options
- Aggressive service level guarantees with an emphasis on committed latency guarantees
- CE2.0 certified

Feature	Details
Choice of bandwidth	2-100 Mb in 2 Mb increments 50 – 1,000 Meg in 50 Meg increments 1000—10,000 Meg in 500 Meg increments
Committed bandwidth	Full bandwidth is treated as Committed Information Rate (CIR) as this is a dedicated service.
Protection	Unprotected only
Choice of interface handoffs	**Fast-E interfaces:** 10BaseTx (copper, RJ45, full duplex) 100BaseTx (copper, RJ45, full duplex) 100BaseFx (fiber, SM/MM 1310nm, full duplex) **Gig-E interface:** 1000BaseLX (fiber, SM, 1310nm, full duplex) 1000BaseSX (fiber, MM, 850nm, full duplex) 1000BaseTx (copper, RJ45, full duplex) **10 Gig Interface:** 10GE WAN PHY:10Gbase SW: 850nm, multimode, 26m-300m 10Gbase LW: 1310nm, single mode, 2m-10km 10Gbase EW: 1550nm, single mode, 30-40km **10GE LAN PHY:** **10Gbase SR:** 850nm, multimode, 26-300m 10Gbase LR: 1310nm, single mode, 2m-10km 10Gbase ER: 1550nm, single mode, 30-40km
Transparent pipes	No deep packet inspection, no MAC learning and no VLAN forwarding required.
Choice of frame sizes	Standard frame sizes (64-1522) and jumbo frame sizes (9000 bytes) on request.
Committed bandwidth	Committed Information Rate (CIR).
Non-service-affecting upgrades	Bandwidth can be upgraded on existing ports without service interruption.
Service Level Agreements (SLAs)	**GDE:** Installation, Availability, Mean Time to Repair, Latency/Frame Delay, Packet Delivery Ratio **NDE:** Ready for Service date, Availability, Mean Time to Repair
MEF Certifications	CE2.0

© 2017 Tata Communications. All Rights Reserved. TATA COMMUNICATIONS and TATA are trademarks of Tata Sons Limited in certain countries.

Priority Ethernet (PE)

Service Details

- Based on MPLS technology
- Choice of 6 classes of service
- Flexible bandwidth options
- Mesh-protection for a very high network reliability
- Bandwidth upgrades or adding/removing sites with no downtime or contract renewal
- Centralized processing for multiple locations with the hub and spoke configuration
- Automatic bursting into higher classes of service to utilize unused bandwidth

Feature	Details
Choice of bandwidth	1-100 Meg in 1 Meg increments 105-145 Meg in 5 Meg increments 150 – 1,000 Meg in 10 Meg increments
Choice of interface handoffs	**Fast-E interface:** 100BaseTx (copper Rj45) 100BaseFx (fibre, SM/MM 1310nm) **Gig-E interface:** 1000BaseLX (fibre, SM, 1310nm) 1000BaseSX (fibre, MM, 850nm) 1000BaseTx (copper RJ45) (case-by-case)
Choice of frame sizes	Standard frame sizes (64-1518)
Mesh protection	Network protection designed with multiple pathways into Tata Communications' PoPs
Non-service-affecting upgrades	Bandwidth can be upgraded on existing ports without service interruption.
Classes of service	Choice of six CoS classes to prioritize frames and regulate network traffic
Service Level Agreements (SLAs)	Installation, Monthly Availability, Mean Time to Repair, Packet Delivery Ratio, Round Trip Delay, Jitter
MEF Certifications	MEF 9 and 14 Certified

© 2017 Tata Communications. All Rights Reserved. TATA COMMUNICATIONS and TATA are trademarks of Tata Sons Limited in certain countries.

Global Priority Stretch Ethernet (PS)

Service Details

- Based on Tata Communications' 's internet backbone
- Fixed and usage based billing options
- Normally only sold in conjunction with an IP port
- A best-effort service
- Choice of bandwidth from 1 to 100 MB on Fast-E and 50 to 1000 Meg on Gig-E
- No new contracts required for change in bandwidth
- Web portal to check circuit utilization

Feature	Details
Choice of interface handoffs	**Fast-E interface:** 100BaseTx (copper RJ45) **Gig-E interface:** 1000BaseLX (fiber, SM, 1310nm) 1000BaseSX (fiber, MM, 850nm) 1000BaseTx (copper RJ45) (case-by-case)
Committed bandwidth	Choice of CIR and burst with usage billing. Burst up to 50% of total bandwidth.
Choice of frame sizes	Standard frame sizes (64-1518)
Mesh protection	Network protection designed with multiple pathways into Tata Communications' PoPs.
Path protection	Option to disable protection switching to back up path i.e. unprotected option
Service Level Agreements (SLAs)	Installation, Availability, Mean Time to Repair, Latency/Frame Delay
Web portal	Check network utilization daily, weekly, and monthly with the help of a web-based portal. View and report trouble tickets Monitor circuit performance Facilitates timely bandwidth management based on actual utilization

© 2017 Tata Communications. All Rights Reserved. TATA COMMUNICATIONS and TATA are trademarks of Tata Sons Limited in certain countries.

10 Gig Ethernet

Service Details

- Based on the world's largest wholly owned wavelength network
- High capacity bandwidth at a competitive price
- Secure, private network with transparent service to more locations
- Guaranteed delivery, quality of service, and SLA options
- WAN PHY and LAN PHY interface customer handoffs
- Global connections to 25 cities in 11 countries
- Choice of protected or unprotected circuits

Feature	Details
Bandwidth	LAN Phy: maximum of 10 G effective throughput at layer 2.
Type of bandwidth profile	One bandwidth profile per UNI/EVC. Only one EVC per UNI.
Classes of service	Port-based, single high-priority class-of-service. Full preservation
Choice of frame sizes (MTU)	No limit on frame size.10G
Choice of interface handoffs	Base-LR: up to 10km 100G Base-LR4
Configuration	Point-to-point EVC service with only two UNIs (MEF 6.1 defined EPL).
VLAN and QoS transparent Pipe	802.1q VLAN transparent. Layer 2 and Layer 3 QoS transparent (i.e. CoS, DSCP, PHB, etc). No prioritisation of traffic within Tata network
Service Level Agreement	Installation, Service Availability, Mean Time to Repair

© 2017 Tata Communications. All Rights Reserved. TATA COMMUNICATIONS and TATA are trademarks of Tata Sons Limited in certain countries.

Dedicated Multipoint Ethernet (DME)

Service Details

- Dedicated Multipoint Ethernet based PBB technology
- Point to Multipoint and Any to Any Network service
- Managed and unmanaged service options
- Bandwidth upgrades with no service interruption or contact renewals

Feature	Details
Choice of bandwidth	2-100 Meg in 2 Meg increments 50-1000 in 50 Meg increments 1,000-10,000 Meg in 500 Meg increments
Committed bandwidth	Full bandwidth is treated as Committed Information Rate (CIR) as this is a dedicated service.
Choice of interface handoffs	**Fast-E interfaces:** 10BaseTx (copper, RJ45, full duplex) 100BaseTx (copper, RJ45, full duplex) 100BaseFx (fibre, SM/MM 1310nm, full duplex) **Gig-E interface:** 1000BaseLX (fibre, SM, 1310nm, full duplex) 1000BaseSX (fibre, MM, 850nm, full duplex) 1000BaseTx (copper, RJ45, full duplex) **10 Gig Interface:** **10GE WAN PHY:** 10Gbase SW: 850nm, multimode, 26m-300m 10Gbase LW: 1310nm, single mode, 2m-10km 10Gbase EW: 1550nm, single mode, 30-40km **10GE LAN PHY:** 10Gbase SR: 850nm, multimode, 26-300m 10Gbase LR: 1310nm, single mode, 2m-10km 10Gbase ER: 1550nm, single mode, 30-40km
Choice of frame sizes	Standard frame sizes (64-1518) Jumbo frames (up to 9000 bytes)
Protected and unprotected circuits	Deterministic path Circuits. Ring protection on protected services
Non-service-affecting upgrades	Bandwidth can be upgraded on existing ports without service interruption.
Transparent pipes	No deep packet inspection and no VLAN forwarding required
Service Level Agreements (SLAs)	Installation, Availability, Mean Time to Repair, Latency/Frame Delay, Packet Delivery Ratio
MEF Certifications	CE2.0 certified

© 2017 Tata Communications. All Rights Reserved. TATA COMMUNICATIONS and TATA are trademarks of Tata Sons Limited in certain countries.

Virtual Private LAN (VPLS)

Service Details

- Any to Any Network service based on MPLS technology
- Multiple Classes of Service (CoS)
- Managed and unmanaged service options
- Bandwidth upgrades with no service interruption or contact renewals
- Real time reporting

Feature	Details
Choice of bandwidth	1-100 Meg in 1 Meg increments 105-145 Meg in 5 Meg increments 150 – 1,000 Meg in 10 Meg increments
Choice of interface handoffs	Fast-E interface: 100BaseTx (copper Rj45) 100BaseFx (fiber, SM/MM 1310nm) Gig-E interface: 1000BaseLX (fiber, SM, 1310nm) 1000BaseSX (fiber, MM, 850nm) 1000BaseTx (copper RJ45) (case-by-case)
Choice of frame sizes	Standard frame sizes (64-1518)
Mesh protection	Network protection designed with multiple pathways into Tata Communications' PoPs
Non-service-affecting upgrades	Bandwidth can be upgraded without service interruption, without changing ports.
Classes of service	Choice of six CoS to prioritize frames and regulate network traffic
Service Level Agreements (SLAs)	Ready for Service date, Availability, Mean Time to Repair, Latency/Frame Delay, Frame Delay Variation, Packet Delivery Ratio
MEF Certifications	MEF 9 and 14 Certified

© 2017 Tata Communications. All Rights Reserved. TATA COMMUNICATIONS and TATA are trademarks of Tata Sons Limited in certain countries.

Managed Ethernet Option

Tata Communications installs network interface devices (NIDs) at the customer premise. Data is collected from the NIDs every five minutes, allowing Tata Communications to deliver constant, end-to-end monitoring of the circuit. In addition to monitoring, this configuration also facilitates rapid diagnosis if network issues occur. This end-to-end capability delivers highly accurate service measurements in line with customer traffic for performance statistics that accurately reflect the customer's traffic flow and experience.

Service Details

- Available for GDE and DME services on the Tata network
- SLAs that extend from customer premise to customer premise
- SLA includes service up time, packet delivery, latency, and jitter
- Web-based customer portal for SLA monitoring in near real time
- End-to-end monitoring i.e. alarms automatically created for access, core network or NID failure

Feature	Details
Service Uptime	Protected circuits – upto 99.995% Unprotected section of circuits – 99.5%
Packet Delivery Ratio	99.97% of frames will pass through the networkMeasurement of the actual circuit path
Latency (Round-trip Delay)	Latency target is calculated based on the actual path
Jitter (One-Way Delay Variation)	Not to exceed 5 ms
Web portal	Check network utilization daily, weekly, and monthly with the help of a web-based portal. View and report trouble tickets. Monitor circuit performance. Facilitates timely bandwidth management based on actual utilization

© 2017 Tata Communications. All Rights Reserved. TATA COMMUNICATIONS and TATA are trademarks of Tata Sons Limited in certain countries.

FAQs

- **Which Ethernet service provides a point to point, dedicated connectivity globally?**
  - Global Dedicated Ethernet Service (GDE)

- **What is the name of the service that offers point to point, dedicated connectivity within India?**
  - National Dedicated Ethernet Service (NDE)

- **What is the difference between GDE and NDE?**
  - GDE is the name given to the point to point, dedicated Ethernet service that extends to any location outside India (Either one point touching a location in India and the other outside India or both end locations are outside India).
  - NDE is the name given to Ethernet service that provides point to point, dedicated connectivity within India only.

- **Which point to point service provides multiple classes of service for traffic prioritization?**
  - Priority Ethernet Service.

- **Does Tata Communications have an any-to-any service that provides the multiple classes of service option as well?**
  - Yes. Our VPLS service offers the customer the choice of classes of service.

- **Does Tata Communications offer usage based billing?**
  - Yes. Tata Communications Priority Stretch Ethernet service is a best effort service that offers usage based billing.

- **Does Tata Communications offer SLAs from customer premise to customer premise as a standard?**
  -N o. As a standard, we offer SLAs from Tata Communications Point of Presence (POP) to Tata Communications POP.

- **What if a customer wants SLAs to be extended from customer premise to customer premise?**
  - Tata Communications offers an "Managed Ethernet option" that enables end to end monitoring of the network.

WAN Ethernet Coverage

Tata's coverage is constantly expanding.
Please see our website for the latest interactive coverage: map.tatacommunications.com

Reference Material

1. Tata WAN Ethernet Page
http://www.tatacommunications.com/vpn/ethernet.asp

2. Provider Backbone Bridging (PBB) Information
http://www.tatacommunications.com/enterprise/network/NGE_video_tutorial/NGE_Technical_Video_v6.html

3. Video on Tata Communications WAN Ethernet Portfolio
http://tatacommunications.com/vpn/wan-ethernet-demo.asp

WAN Ethernet Services

For the latest information please see: http://www.tatacommunications.com/

For further information on our WAN Ethernet Services, visit www.tatacommunications.com

Contact Us | **Share**

© 2017 Tata Communications. All Rights Reserved. TATA COMMUNICATIONS and TATA are trademarks of Tata Sons Limited in certain countries.