

Metrofibre networkx

LIGHTING THE WAY FORWARD



Africa's first MEF 9 & 14 Network



Mobile Backhaul Evolved 3G/4G-LTE

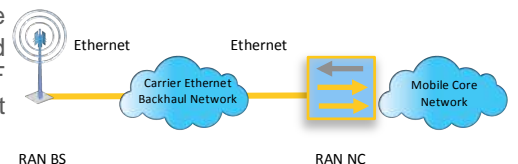
Features - Benefits

- ✓ **Open Access Metro Ethernet Network**
 - Open to All Service Providers on Equal Terms
- ✓ **Monitoring of Ethernet Services - Ethernet OAM:**
 - Verify connectivity
 - Identify configuration faults
 - Measure service performance
 - Based on following standards
 - IEEE 802.3ah: Link OAM
 - IEEE 802.1ag: Connectivity Fault Management
 - ITU-T Y.1731: Performance Monitoring
- ✓ **Scalable, Flexible & Cost Effective Service types - Port-based and VLAN-based:**
 - E-Line
 - E-LAN
 - E-Tree
- ✓ **Performance Assurance Guarantees with Levels of Performance Reliability based on:**
 - Quality (QoS) and Class of Service (CoS)
- ✓ **Metro Ethernet Forum (MEF) Compliant Network**
 - International accepted network, which guarantees service delivery across Multiple Operator/Provider Networks
 - MEF 22 - Mobile Backhaul Implementation Agreement
 - MEF 9 & 14

"For 2G, 2.5G and 3G (Rel99)
See MFN Mobile Backhaul Synchronized"

Metrofibre networkx is building a Carrier Ethernet fibre optic "Open Access" infrastructure that will provide managed bandwidth over the "Last Mile" connecting Service and Application Providers to their customers, including Mobile Backhaul.

The **Metrofibre networkx™** infrastructure is fibre optic based and the Managed Bandwidth Services comply with the MEF (Metro Ethernet Forum) Carrier Ethernet recommendations.



Mobile Backhaul: With the introduction of 3G/4G-LTE technologies and smartphones supporting higher bandwidth and faster download rates, the increase in data traffic and the number of mobile subscribers has dynamically changed usage patterns and variation in type of traffic transported across today's cellular mobile network.

Subsequently, this has fueled a demand for higher backhaul network capacity, intelligence and critical requirements to migrate mobile backhaul to Carrier Ethernet technologies that can support quality of service (QoS), User traffic prioritization and Class of Service (CoS) to separate traffic streams, lower packet loss and Performance Monitoring.

Mobile Backhaul over Carrier Ethernet has the advantage of being cost effective, easy to use and managed, while supporting various services and maintaining performance requirements.

Metrofibre networkx™ Mobile Services: Metrofibre networkx Carrier Ethernet highly manageable VPN-based Backhaul Services (E-Line, emulated LAN [E-LAN] and E-Tree services) can provide either unicast (Point-to-Point) or multicast (Point-to-Multipoint) services at Layer 2 or Layer 3, between the Radio Access Network Base Station (RAN-BS) and the Radio Access Network Network Controller (RAN-NC).

How do we we do it? Depending on the network's design, Metrofibre can backhaul Tagged (Q-in-Q) or/and Untagged frames between the RAN-BS and RAN-NC.

- Frames coming in from the cell tower are tagged with both location and service information. The location tag is stripped from the frames at the cell site device. The frames are then sent with only the service tags that are recognized all through the network into the Mobile Core.

- Frames coming in from the cell tower that are only tagged with the location VLAN information. The service tags are added at the cell site.
- Frames coming from the cell site untagged. The appropriate location and service VLAN tags are added at the RAN-BC with the location VLAN tag information based on the port that the untagged frames were received.

Location VLAN tag is information based on the site from where they originated and is present all through the backhaul network and packets are handed off into the mobile core with the tag information.

A service VLAN tag identifies the service that is being provided on the particular VLAN. Each service can be offered on a separate VLAN or all the services can be bundled into a single pipe that uses one VLAN for all services versus VLAN per service. The traffic in the backhaul can thus be separated either based on services or location.

The Mobile Backhaul VPN Based Service offer the following availability and performance based service level agreements (SLAs).

Mobile Backhaul Service Gold

- 4hrs response-time and 99.95% uptime guaranteed per year

Mobile Backhaul Service Silver

- 8hrs response-time and 99.55% uptime guaranteed per year

Mobile Backhaul Service Bronze

- 12hrs response-time and 98% uptime guaranteed per year

Standard Service

- 24hrs response-time

Performance Assurance

For best traffic performance assurance guarantees, we track and measure the performance of traffic transiting across the entire Metrofibre Backhaul Network, from RAN-BS interface (NID) to RAN-NC (NID) interface, with our Network Performance Management system that collects, monitors and measures end-to-end service performance for each Class of Service (CoS) priority.

Class of Service (CoS): Each of the traffic types/applications; voice, video, network signaling management, and best-effort data can be assigned to a class of Service and prioritized through the network accordingly type of CoS guarantees.

Class of Service (CoS) Mapped

CoS TRAFFIC CLASS	CoS SERVICE CLASS	DIFFSERV TRAFFIC CLASS WIRED PACKET SWITCHED NETWORK	TYPICAL APPLICATIONS
Background	Low (non-real-time traffic)	Best Effort (BE)	Wired/Mobile IP data/email
Interactive	Low (non-real-time traffic)	Assured Forwarding (AF12)	TCP-based services—HTTP/Telnet
Streaming	Medium (real-time traffic)	Assured Forwarding (AF11)	UDP/RTP—Streaming video
Conversational	High (real-time traffic)	Expedited Forwarding (EF)	Voice—VoIP/Video conferencing

Service Level Agreements (SLA) Here at **Metrofibre network™** our Service Level Agreements (SLA's) have been specifically designed to ensure customers uptime of the network and the end-to-end service traffic performance.

Backhaul Reliability

Our Carrier Ethernet Link management OAM is configured to offer reliability and fault detection. OAM can provide Carrier Ethernet failure detection at the physical and link levels. Hence it is possible to provide either link or connectivity fault management (CFM)

Network Operations Centre:

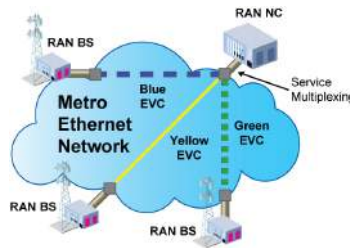
Our Backhaul Services are monitored centrally at our state of the art Network Operations Center (NOC) to the pre-defined Mobile Backhaul CoS Service Performance parameter thresholds.



Network-Uptime Assurance

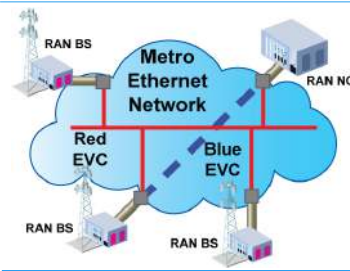
For the best network-uptime assurance guarantees, we ensure that our network designs have sufficient resiliency built-in to meet the most stringent of Service Level Agreements.

Metrofibre network™ Backhaul Service Definitions



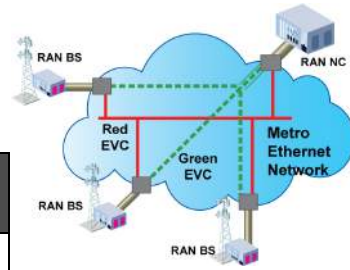
Point-to-Point (E-Line)

- Similar to leased lines
- Requires traffic separation per RAN BS at RAN NC
- Private and virtual private line EPL & EVPL
- Diagram shows a EVPL



Point-to-Multipoint (E-LAN)

- Similar to leased lines
- Requires traffic separation per RAN BS at RAN NC
- The specification cover private and virtual private line
- Diagram shows a EVPL



Routed Multipoint (E-Tree)

- Similar behavior as leased lines
- Supports simpler RAN BS and RAN NC solutions
- Multiplexing could be used for increased traffic separation
- The specification cover private and virtual private routed multipoint services
- Diagram shows a EVP-Tree

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