Scalable Backhaul Solutions for Next-Generation Networks

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ACCESS NETWORKS ECONOMICS ARE BREAKING

Wireline

- Growing demand for business and residential broadband applications is straining existing access networks
- Service providers are struggling financially and operationally to provision, deploy, operate and manage thousands of 1GE and 10GE ports

Wireless

- Surge in devices and media-rich applications creates relentless demand for bandwidth and quality of experience
- Migration to 4G/LTE creates challenging architectural and scaling issues
- Mobile access network (MBH) represents up to 35% of MNO capex
## IT’S TIME FOR A NEW ACCESS NETWORK

<table>
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<tr>
<th>Old</th>
<th>New</th>
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<td>- Multiple access networks for different applications with many touch points</td>
<td>- Seamless end-to-end service delivery network for all applications and customers</td>
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<td>- Capacity focused – adding point to point bandwidth from access to aggregation</td>
<td>- Operational intelligence and traffic steering make efficient use of existing bandwidth</td>
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<td>- “Innovation” has been limited to replacing TDM with Ethernet</td>
<td>- Flexible services applied at the access layer and optimized per customer</td>
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<td>- Macro cell backhaul</td>
<td>- Macro cell AND Micro cell backhaul</td>
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<td>- Truck rolls often required for minor operational changes</td>
<td>- Remote provisioning for rehoming and other configuration changes</td>
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<td>- Inconsistent call quality (jitter, dropped calls, cell yell, etc.)</td>
<td>- Integrated synchronization for service quality and SLA commitment</td>
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ARCHITECTURAL TRANSFORMATION

Hierarchical to Flat; Hub-Spoke to Fully Meshed; TDM/ATM to All-IP;

All-IP Transport bearer from cell-site to packet core
SEAMLESS MPLS

Simplify the Metro and Core with Single Control Plane, QoS, OAM

Separation of Services Plane from Transport Plane allows Insertion of local Content & Services

Scalability to 10s of thousands of eNodeBs / CSRs

Deterministic failure detection and restoration times under 100ms
COMBINED SYNCHRONOUS ETHERNET AND IEEE1588-2008 (PTP)

Synchronization is a critical requirement for 3G/4G wireless networks

Propagation of frequency over physical layer more accurate than over packets

SyncE used to derive frequency and PTP used to drive phase

SyncE and PTP traceable to common source
FAN-LESS COOLING AT THE CELL SITE

A fan, being a mechanical element can wear out due to bearing fatigue, lubricant degradation or dust that the device is exposed to when placed outdoor.

Fan life expectancy is 70000 hours assuming central office indoor use.

Considering Environmental factor of 2 (Telecordia’s SR-332) for outdoor use the life expectancy reduces to 35000 hours or 4 years.

Annual maintenance of fan filter is required to protect the fans from outdoor pollutants and dust – this results in downtime.

A Cell site router with three fans will consume about 7-8 watts of power.

- This amounts to about **16% extra power** consumption compared to a fanless cell site router with typically 50W power consumption.
OPTIMAL TRAFFIC MANAGEMENT OVER CONVERGED NETWORK

2G/3G Network

- Role of the MTSO diminishes over time
- 1,000s Per MSA

LTE/Small Cell Network

- Opportunity for bypassing MTSO
- 10,000s Per MSA

3G UMTS: UTRAN

- MTSO: 100s
  - Circuit Switched Voice
  - Radio Resource Control (RNC)
  - Routing

- RDC: 10s
  - Packet Mobility Control
  - Packet Mobility Bearer
  - Routing

- NDC: 1s
  - Packet Anchor
  - Services
  - Routing

LTE E-UTRAN & EPC

- MTSO: 100s
  - Packet Mobility Control
  - Routing

- RDC: 10s
  - IMS Voice
  - Packet Anchor
  - Services
  - Packet Mobility Bearer
  - Routing

- NDC: 1s
  - Routing
INTRODUCING UNIVERSAL ACCESS

Universal Access unifies disparate edge networks into a single service delivery platform for business, residential and mobile applications.

Multiple physical access networks remain to "backhaul" from access to edge, creating a seamless end-to-end service delivery system, with scale and financial viability.

Universal Edge unifies disparate edge networks into a single service delivery platform for business, residential and mobile applications.

Single OS
Single control plane
Seamless end-to-end service
Operational simplicity and scale
Financial viability
INTRODUCING
THE JUNIPER ACX UNIVERSAL ACCESS ROUTERS

ACX Series

- Juniper’s Universal Access solution for mobile backhaul (LTE, 2G/3G), business Ethernet services and circuit to Ethernet migration
- Complements Universal Edge with a seamless end-to-end service delivery platform, extending the existing network and all its capabilities to the access point
- Fixed and modular platforms
- Running Junos from access to edge to core

THE NEW BENCHMARK FOR ACCESS NETWORKS

- 60 Gbps platforms: 3x the performance of nearest competition
- Industry’s only 10 GbE capable access router
- Most flexible and adaptable service architecture
- Automated service provisioning accelerates deployments
- Only open access system for extensibility
- Highest QoE with proven and deployed precision timing
- Environmentally hardened with 65w Power over Ethernet (PoE)
END TO END RESILIENCE – RSVP SIGNALLED LSPS
END TO END QoS

Packet classification on ingress
QoS marking / remarking to MPLS layer
Queueing on trunk and Access sides
Delivers High End to end Quality of Experience
END TO END SERVICE MANAGEMENT

Service Provisioning with QoS
Built in service monitoring
Element Management
SUMMARY

Operators must rethink backhaul beyond just transport

Next generation services call for intelligence from the cell site

Incremental revenue sources by moving backhaul to L3+ intelligence

- VPN
- Business class services and SLAs
- Tiering
- Personalization

Next-gen backhaul needs fan-less cell site routers with 10GE interfaces for small-cell aggregation