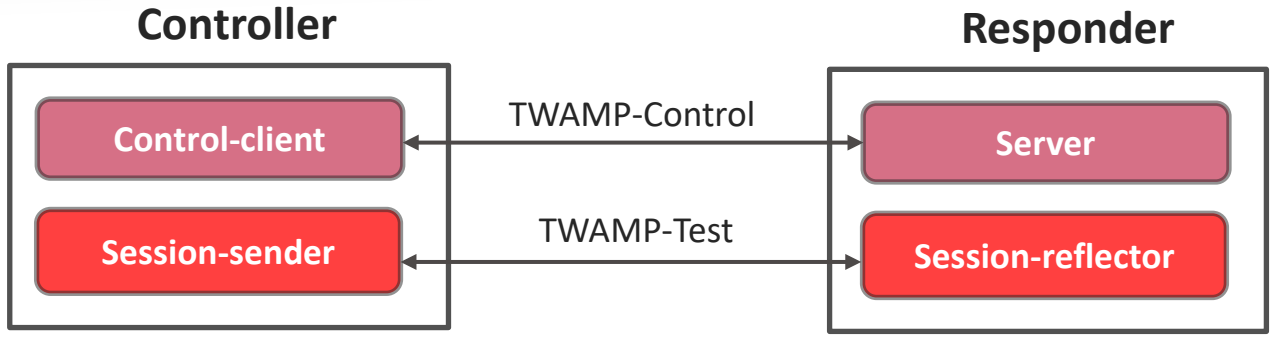
TWAMP Explained

Measuring Performance in IP Networks

What is TWAMP

- ***T***wo-***W***ay ***A***ctive ***M***easurement ***P***rotocol (IETF RFC 5357)
- Uses active probe packets to measure two-way delay between two end-points in IP networks
  - Timestamps are applied for high accuracy
- Typically does not requires that both end-points are time-synchronized
  - One-way delay measurements require sync.
- Additional capabilities: packet loss ratio, continuity check, one-way and two-way packet delay variation

TWAMP Test Flow



TWAMP-Control:
1. Connection setup
2. Integrity protection (optional)
3. TWAMP-Control commands

TWAMP-Test:
Sender: sending/receiving probe packets
Reflector: reflecting probe packets

TWAMP-Light: TWAMP-Control can be replaced by management plane, per RFC 5357 Appendix IT-Control

TWAMP-Control:
1. Stop-Sessions

Other L3 PM Methods

- ICMP Echo (“Ping”): Internet Control Message Protocol (IETF RFC 792). Used for connectivity check and rough roundtrip delay estimations between any IP devices
- IP SLA: Proprietary Cisco method for measuring performance across router networks

TWAMP is mostly suitable for premium L3 business services (with SLA guarantees) and for LTE backhaul service assurance!3

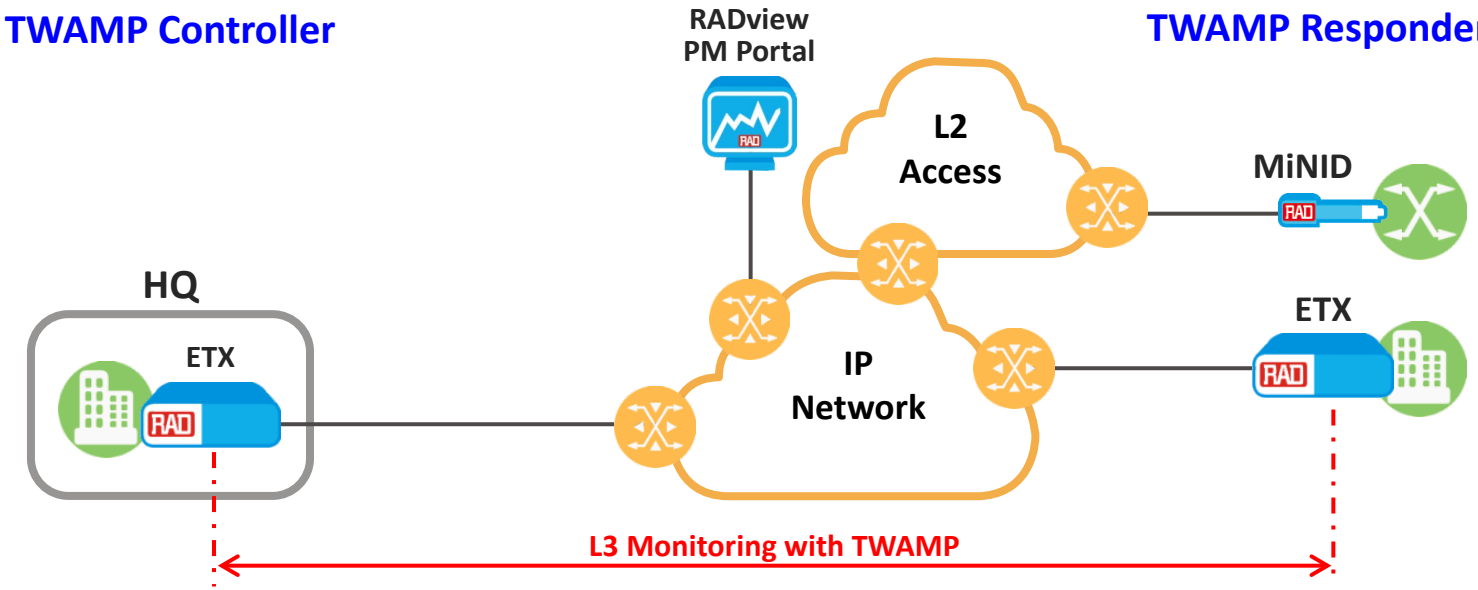
TWAMP vs. ICMP Echo ("Ping")

Your Network's Edge®

Capability	TWAMP	ICMP echo (Ping)
Original purpose	Performance monitoring across IP networks	Connectivity check, Basic round-trip delay capability
Monitoring existing infrastructure	Available in certain routers, NIDs or probes	Yes (Widely supported in every NE and Operating systems)
Transparency through network elements allowing generic, robust, predictable test methodology	Yes (test based on UDP traffic which passes through network)	In some cases routers block or rate limit ICMP
Round trip Delay KPI	Yes	Insufficient accuracy due to slow ICMP processing in network elements
1-way Loss KPI	Yes	No
1-way delay KPI	Yes	No
1-way delay variation (PDV) KPI	Yes	No

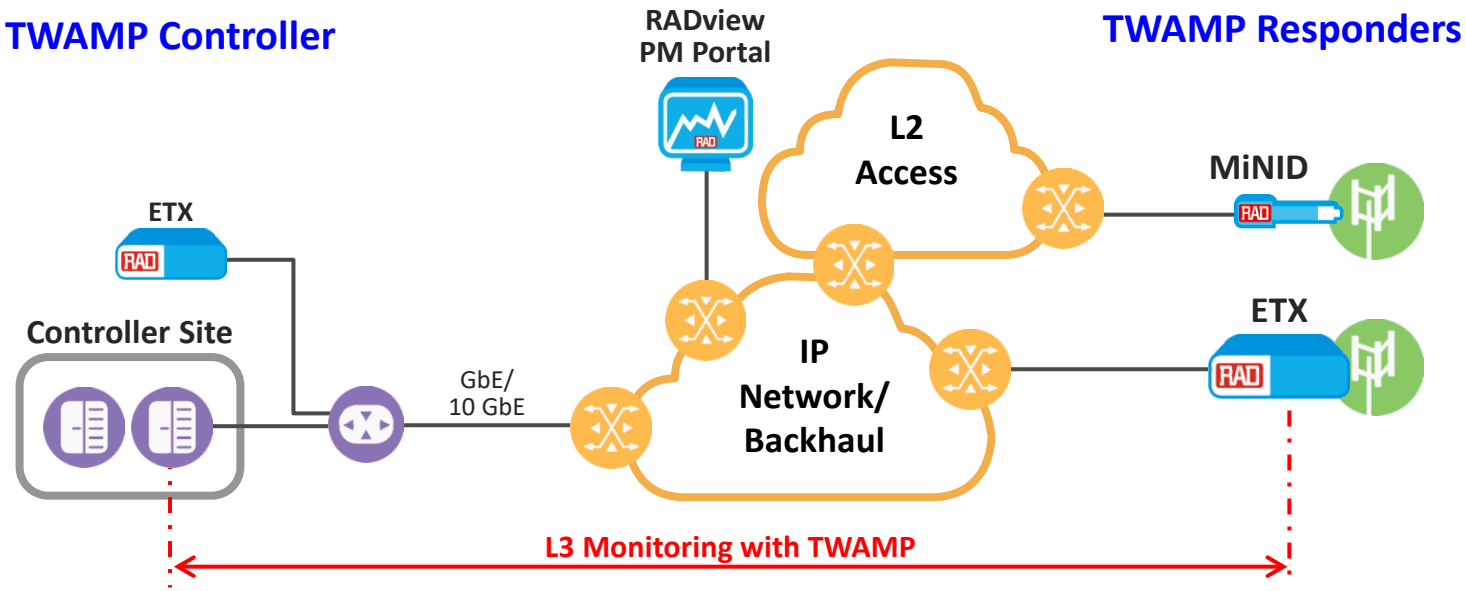
RAD's TWAMP Solution

RAD's TWAMP Solution for Business Services



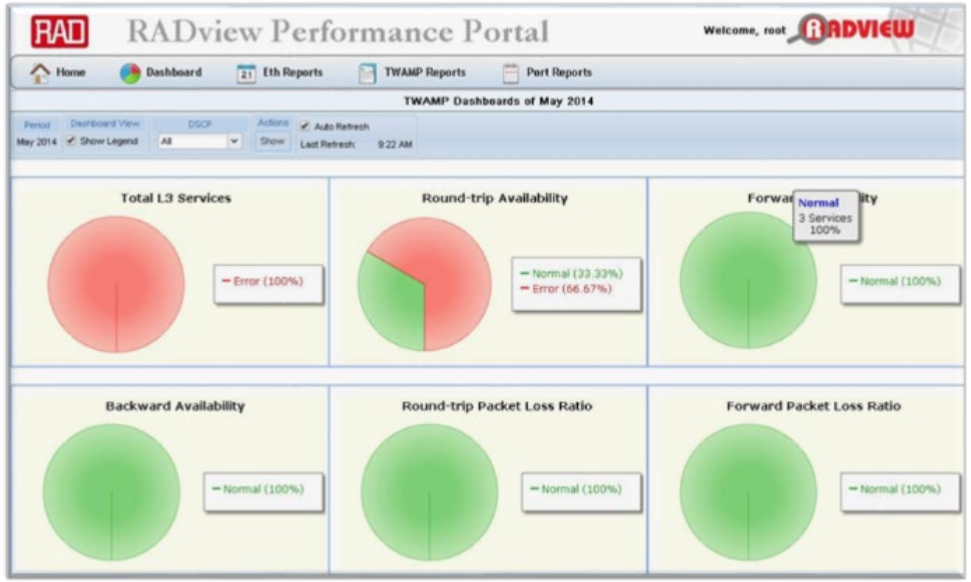
- RAD's Service Assured Access solution enables end-to end performance monitoring for IP VPNs (TWAMP) AND L2 PM (Y.1731) for MEF CE 2.0 services
- Unified performance management results across L2 and IP networks
- On-demand or always-on monitoring
- Results displayed in RADview PM Portal

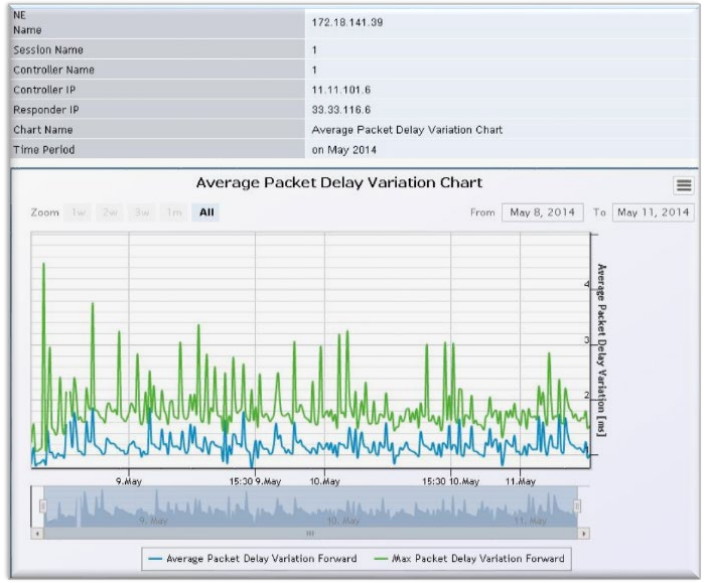
RAD's TWAMP Solution for LTE Backhaul



- Tight control of mobile backhaul transport networks for SLA assurance to meet stringent performance requirements in a dynamic LTE environment
- On-demand or always-on monitoring, with presentation in RADview PM Portal

TWAMP PM with RADview Portal

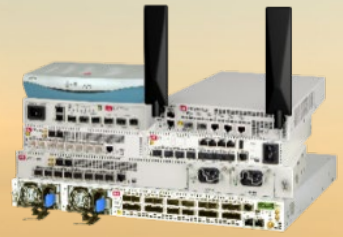




- Collects KPIs from RAD devices: packet delay (latency), packet delay variation (jitter), packet loss ratio, throughput
- Enables network behavior analysis with intuitive presentation of performance results, drill-down to SLA status per KPI

TWAMP Takeaways

- TWAMP is an effective standard-based method for monitoring performance in IP networks
- Performance guarantees in L3 are now expected for premium business services and LTE backhaul
- TWAMP support is therefore a critical element in the PM toolbox of service assurance NIDs
- RAD's Service Assured Access solution provides full L2 and L3 support for service delivery and performance monitoring in all form-factors:



ETX-2/ETX-2i
Carrier Ethernet Demarcation

MiNID
Miniature Programmable Network Interface Device

RADview
Management and Domain Orchestration

Thank you

For your attention

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