

RAD Data Communications Megaplex-2100 ML-IP Ring delivers high-quality, resilient voice transport over Ethernet ring structures



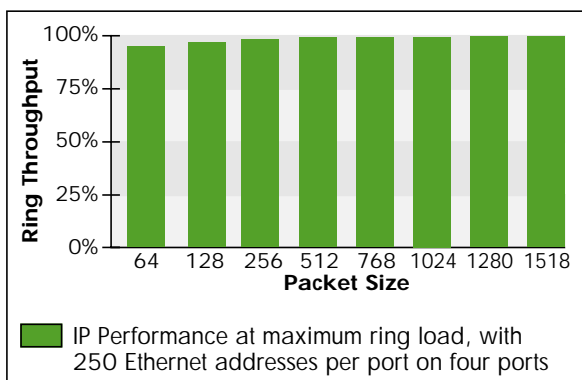
RAD Megaplex-2100

RAD Data Communications commissioned independent tests at the European Advanced Networking Test Center (EANTC) to verify voice quality and service availability for the new Megaplex-2100 with ML-IP ring feature. The test plan, prepared and executed by EANTC, evaluated in detail if voice and data traffic can be forwarded in parallel over the Ethernet ring infrastructure implemented with Megaplex-2100 ML-IP modules.

The Megaplex-2100 passed all tests in three test areas:

- The ring showed superb service resilience and quality for voice connections.
- The E1 TDM traffic was always properly prioritized.
- The rerouting time for voice trunks exceeded requirements in all tests.

With an average loopback rerouting time of 18 ms (ML-IP ring) and 11 ms (ML-IP + IPmux), and a maximum rerouting time of 27 ms / 14 ms, it observed the voice carrier's requirements in all cases. Tested for voice quality, the Megaplex-2100 preserved the best possible quality:



Results of the perceived speech quality tests proved that the TDMoIP voice transmission quality was comparable to ISDN (MOS over 4.5). The voice trunk remained stable and showed exactly the same quality even with more than 400 Mbps Ethernet background traffic in the ring.

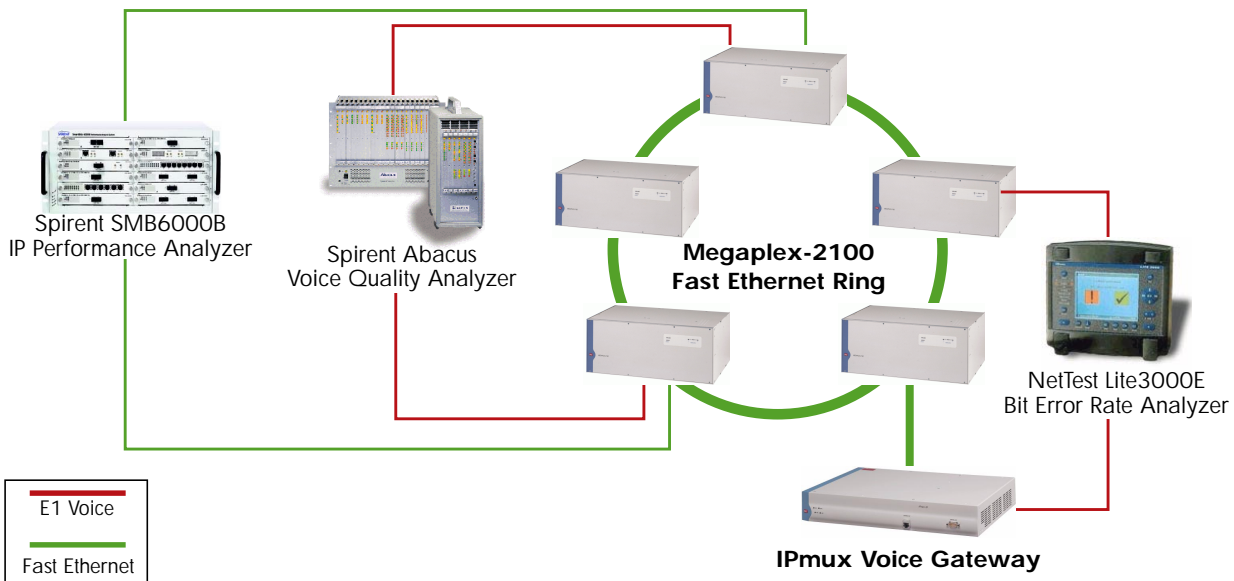
In addition, the Ethernet / IP performance evaluation proved the Megaplex-2100 ML-IP is ready for the enterprise metropolitan area market. When we loaded all four ring components to the absolute maximum, IP packet throughput was at least 94.9 % of the bandwidth in the ring for 64 byte packets, and reached line rate for large packet sizes. The test revealed similar results when repeated with 250 Ethernet addresses. Ethernet traffic converged in the ML-IP ring after less than 12 seconds after a ring segment failed. The ring topology change mechanisms always worked fine.

SUMMARY OF TEST RESULTS

Service Resilience	
Fast protection switch-over in case of segment failure	PASS
Stable operation of ring segments	PASS
Data path recovery after complete ring failure	PASS
Ethernet traffic convergence after link segment failure	PASS^a
Congestion handling — Prioritization of TDM traffic over data traffic	PASS
TDM Voice Features	
Transparent fractional E1 transport	PASS
Perceptive speech quality (Mean Opinion Score)	PASS
ML-IP does not influence E1 call completion rates	PASS
Ethernet / IP Features	
Verify LAN traffic performance, including multiple IP- and Ethernet-attached stations	PASS^b
Verify transparent Ethernet LAN service for various data protocols	PASS^c
Rerouting performance for high priority LAN traffic	PASS

- Medium performance, rerouting time 9–13 seconds for up to 250 Ethernet addresses
- Low 64-byte packet performance before RAD improved firmware; 94 % throughput afterwards
- High latency under maximum load

Test Configuration



RAD's Megaplex-2100 with ML-IP ring received an EANTC certificate because it provides a well-performing solution for combined IP and voice MAN enterprise traffic.

<p>RAD Data Communications Megaplex-2100 with ML-IP ring</p> <p>Performance Tested:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Service Resilience <input checked="" type="checkbox"/> TDM Voice Quality <input checked="" type="checkbox"/> Ethernet Transport <p><small>Test Period: June 2002 © 2002 EANTC AG http://www.eantc.com</small></p> <p>Certified by EANTC 2002</p>

Test Methodology

EANTC combined analyzers and load generators to evaluate all aspects of the Megaplex-2100 voice and data transmission:

- A Spirent SMB6000B with Fast Ethernet interfaces was used to generate and analyze wire speed Ethernet data on multiple ports;
- A Spirent Abacus ISDN bulk call generator emulated ISDN calls on the E1 links of the ML-IP boards, and ran speech quality assessment algorithms according to ITU-T P.861 (PSQM+);
- A NetTest Lite3000E bit error rate analyzer verified exact E1 frame transmission over the TDMoIP tunnels.

Several test cases used two analyzers in parallel, loading the Megaplex-2100 with Ethernet and voice data at the same time.

In the course of the test, EANTC uncovered Ethernet performance limitations, especially when the ring was loaded with traffic from several hundred emulated Ethernet stations — i.e. used as a large switched Ethernet backbone. RAD corrected the problem within a few days and provided an updated firmware version to EANTC. Further testing proved that Ethernet performance improved substantially.

About RAD

Founded in 1981, privately held RAD Data Communications is a leader in innovative access solutions supporting multiservice access over SDH/SONET, DSL, ATM, and IP transport networks. RAD's product solutions are used by carriers, service providers, and various enterprise networks in more than 100 countries around the globe.

About Megaplex ML-IP

The Megaplex is a flexible, modular multiservice multiplexer that supports up to four full E1/T1 links per chassis. The Megaplex enables integration of multiple dedicated voice, ISDN, video and LAN channels onto E1/T1 trunks. It can be deployed at the point-of-presence in the exchange or at the remote distribution node location. The Megaplex is especially suitable for utilities applications, small communities (as a remote distribution node) and campus environments.

Support of TDMoIP and RFER make it an ideal solution for enterprise metro area networks.

About EANTC



The European Advanced Networking Test Center (EANTC) offers vendor neutral network test facilities for manufacturers, service providers and enterprise customers. Primary business areas include interoperability, conformance and performance testing for IP, ATM, MPLS, and broadband voice related network technologies and applications.

EANTC also provides network related consulting and seminars for ATM, MPLS and other networking technologies.