JDSU

COMMUNICATIONS TEST & MEASUREMENT SOLUTIONS

Metro Ethernet Test Portfolio

A Solution Guide for Carrier-Grade Testing and Service Assurance

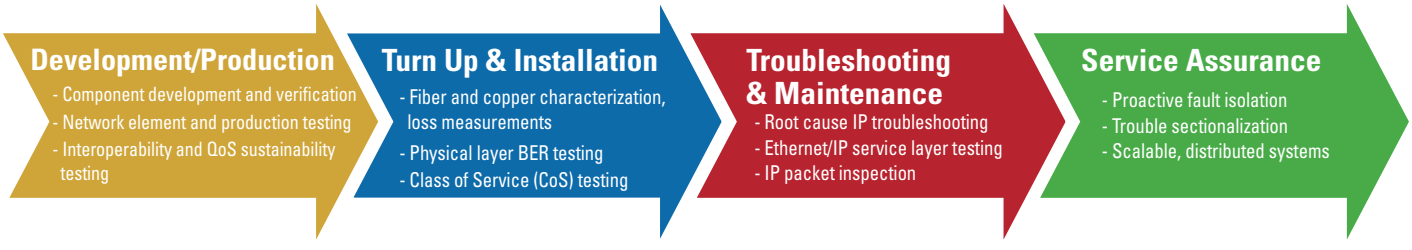
2007 FROST & SULLIVAN
Global Communications Test & Measurement Company of the Year Award

Introducing next generation Ethernet/IP-based services over carrier-grade Metro Ethernet networks yields increases in both complexity and costs for NEMs and service providers. With time and money at stake, successful delivery of the business and consumer applications depends on building a network infrastructure to evolve as their needs change, while being agile enough to incorporate new services and applications as they are introduced into the marketplace.

Carrier-grade Metro Ethernet networks are emerging as key components in business (VoIP, Disaster Recovery, Video Conferencing, etc.) and consumer (Triple-play) service delivery. These networks facilitate service aggregation and work in concert with different network infrastructures and tunneling technologies (VLANs, MAC-in-MAC and VPLS/MPLS) that provide common QoS, traffic engineering, redundancy and scalability across the service infrastructure. The result is a complex mix of parameters and requirements which bring many challenges to NEMs and service providers/operators. These include verification of network elements, reduction of installation times, and assurance of service availailability – all geared towards providing customers with high-quality of service, thereby ensuring customer retention. While organizations such as the Metro Ethernet Forum, ITU, IEEE, and IETF, have developed certification standards, further work is required to make Metro Ethernet more suitable for the emerging carrier-grade business and consumer service offerings.

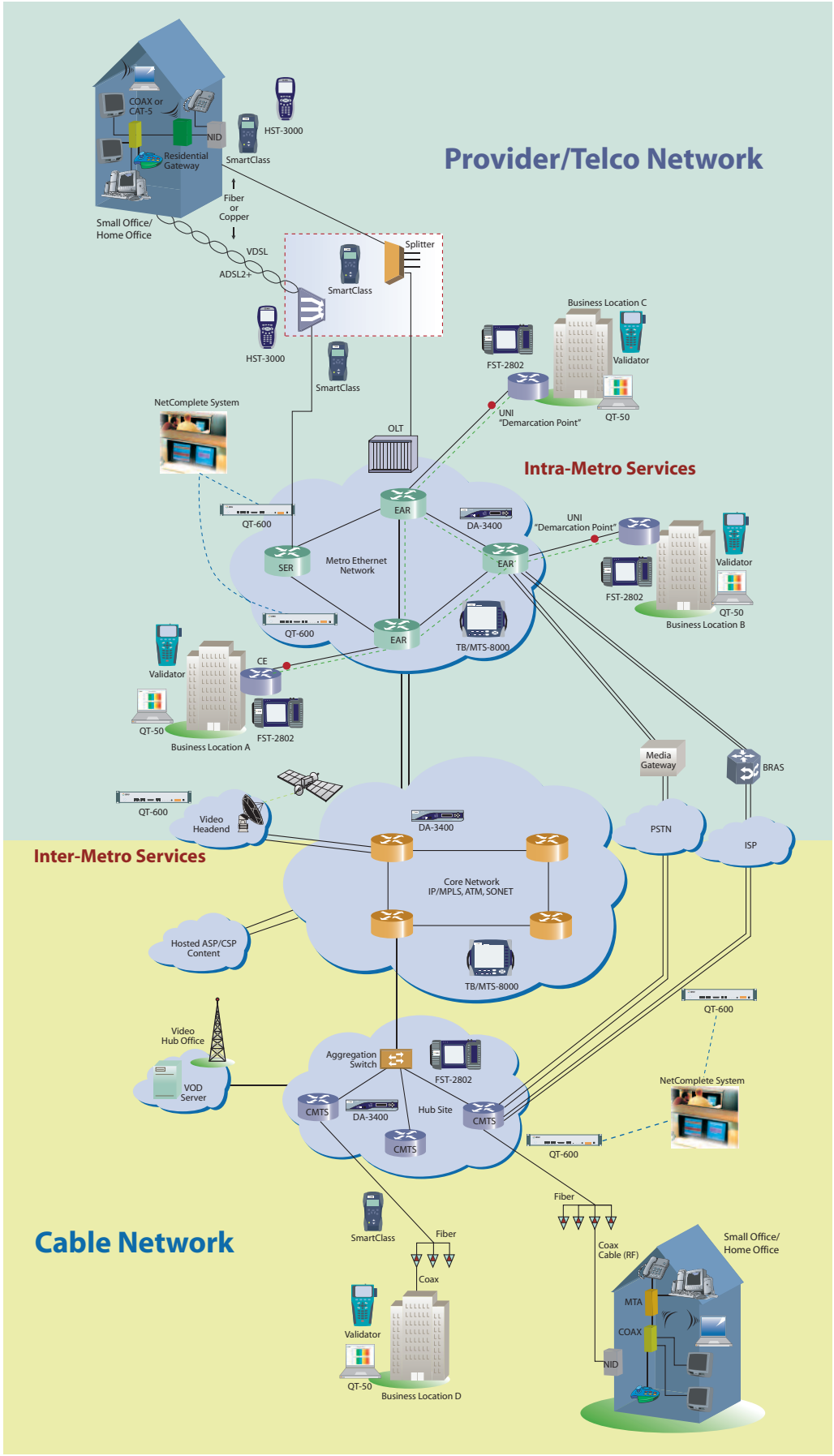
The JDSU portfolio, a suite of instruments, systems, and software, is built to address these challenges, providing an integrated, end-to-end approach to test Metro Ethernet products and services. This approach provides key problem-solving capabilities beginning with verifying network element behavior in the lab. It spans providing consistent and repeatable processes for turning up new services in the field and extends through overall problem sectionalization and fault isolation in order to assure service integrity for the end user.

METRO Ethernet Forum MEMBER



JDSU Addresses the Metro Ethernet Services Lifecycle
JDSU offers a complete portfolio of products that enable manufacturers and service providers to address testing and service assurance challenges throughout the Metro Ethernet Lifecycle

JDSU Metro Ethernet Solutions Test at Every Point in the Service Delivery Network

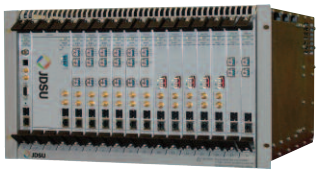


The JDSU ME Test Portfolio
JDSU offers a comprehensive suite of instruments, systems, and software covering the entire network element and service deployment lifecycle.

Metro Ethernet Test and Measurement Portfolio

Development/Production

Network Element Testing and Production



TestPoint Family

TestPoint offers a flexible and cost effective telecom and datacom test solution for Production and Service Verification Testing (SVT). It consists of a modular platform that provides versatility in configuring interface types, transmission rates, protocols, and port density. One of the TestPoint's key attributes is support for multiple rates on single modules. The platform also features an easy-to-use GUI and simple automation interface. It is available in three chassis formats: a lightweight, fixed interface TS-10, a 3-slot TS-30, and a 17-slot TS-170. TestPoint provides 1G/2G/4G/10G Fibre Channel support and Ethernet features from 10Mbis/sec up to 10 Gigabit Ethernet. Transport protocol coverage includes SONET/SDH up to 40G, and Optical Transport Network (G.709) including overclocked rates.

ONT-5xx Family

The ONT-5xx is designed for R&D and SVT applications with in-depth testing and comprehensive libraries for test automation. The modular solution supports multiple technologies for telecom and datacom including DSn/PDH, SONET/SDH, next generation VCat/LCAS and G.709/OTN from 1.5Mb/s to 43Gb/s including high accurate Jitter/Wander testing as well as 10M to 10GigE/10GigE OTN (G.709 overclock) interfaces. 10GigE supports generation and analysis of up to 256 traffic flows with multiple tagging (VLAN/MPLS), QoS and service disruption and can be mapped into OTN frames. The ONT-506 comes with a classic desktop form factor with large screen and handle while the ONT-512 is tailored for rack mount and larger port counts. Multiple users can log in to the ports independently, define session and may share views among different locations.

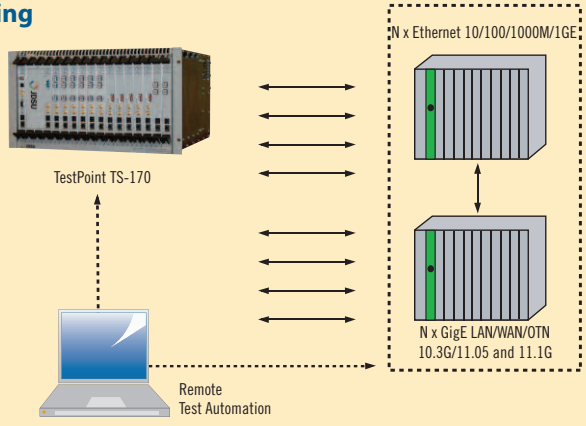
Board Design, System Verification, and Production Testing

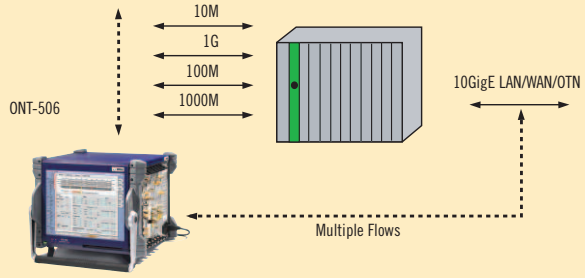
Perform Physical/Link Layer tests

- Verify line offset range, correct Link connection
- Verify WIS SDH/SONET Overhead
- Stress network element by inserting PCS errors and verifying circuit/transmission integrity

Perform Service verification tests

- Generate MAC layer traffic and verify connectivity, throughput, and latency
- Check behavior with multiple Ethernet streams, verify QoS
- Perform RFC 2544 conformance testing





10/100/1000M/1GE Equipment Testing

- Verify interface frequency, offset
- Verify Ethernet connectivity, throughput, and latency

10GigE LAN /WAN/ OTN Testing

- Verify interface offset
- Verify Ethernet throughput and latency
- Verify Wrapper/De-wrapper operation
- Check FEC behavior

Turn Up & Installation | Troubleshooting & Maintenance

Service Deployment Testing
Turn-up, Installation, and Basic Troubleshooting

T-BERD®/MTS-8000

A next-generation, modular, and cost-effective platform solution, featuring an innovative design that combines traditional SONET/SDH testing and Ethernet/IP testing – all in a single test module. The T-BERD/MTS-8000 provides physical layer test modules including OTDR, PMD, and CD and service layer test modules such as 10 gigabit Ethernet and SDH/SONET to test FTTx, CWDM, and DWDM networks.

T-BERD/MTS 8000 Transport Module (Option)

The Transport Module supports 10 Mb/s to 10 Gb/s Ethernet testing, ensuring that proven test methodologies for Ethernet services remain the same regardless of the rate. The Transport Module offers a blend Ethernet/IP/VPLS/MPLS (with multiple streams), Fibre Channel, OTN and BERT test capabilities in a superior, portable design.

FST-2802 TestPad™

A portable field test instrument targeted for the installation and maintenance of Metro Ethernet services, featuring a variety of technologies on a widely accepted test platform. Test capabilities include bit error rate testing (BERT) and verifying frame loss, round trip delay (RTD) and packet jitter as per Metro Ethernet service level agreements (SLAs). Advanced features, such as multiple streams, VLAN stacking and discovery, graphical results allow for the testing of true customer traffic conditions in the network.

HST-3000 Ethernet Module

The HST-3000 Handheld Services Tester is a modular, portable, and rugged instrument that tests multiple technologies (xDSL, Copper, T1/E1, fiber, Ethernet, etc.) on both Metro and Access networks. The Ethernet module supports physical layer testing (cable diagnostics), service quality verification (RFC 2544 and CoS), and application performance analysis (VoIP and IP Video). This unique blend of features in a single module makes the HST-3000 the premier field tool for next generation Ethernet services rollout.

SmartClass™ Ethernet

A cost-effective and rugged portable test instrument designed for field technicians who are responsible for installing Ethernet and IP services. The SmartClass Ethernet's test capabilities, which range from cable diagnostics to RFC 2544 testing, enable service providers to successfully verify Metro Ethernet SLAs at installation.

Validator-NT™ Ethernet System Speed Certifier

An all-in-one Ethernet System Speed Certifier that delivers network test and configuration functionality. It uses active network tests to identify network devices and verify Internet connectivity by pinging up to seven different IP addresses simultaneously. The Validator-NT certifies (per IEEE 802.3 data speed carrying specifications) that cabling will perform as rated for speeds up to 1 Gb/s; measures cable length and distance to opens and shorts; and tests for continuity, proper termination, and polarity. The accompanying Plan-Um™ software allows planning and documentation of test results.

Service Assurance

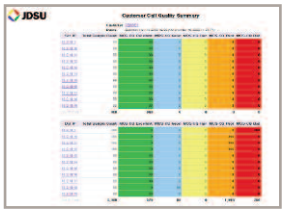
Service Deployment Testing
Remote and Longterm Monitoring

DA-3400 Data/IP Analyzer

A portable protocol analyzer designed for service support engineers tasked with troubleshooting problems at the IP layer and above. The DA-3400 is a multi-technology, 7-layer, hardware-based IP analyzer built to identify root cause impairments by providing expert analysis for pinpointing and solving complex IP, VoIP, and application problems.

NetComplete ME Service Assurance Solution with the QT-600 Ethernet IP & Triple-Play Probe

A service assurance solution that provides service turn-up verification, problem segmentation, and troubleshooting test capabilities. NetComplete provides automated, centralized remote testing capabilities complete with drill down IP and data analysis functionality, allowing the service provider to quickly and efficiently identify and resolve service degradations in their networks.



QT-50 Software Agent

Offers providers the flexibility to monitor and rapidly troubleshoot VoIP issues as experienced by the end customer. Easy to implement, the Agent may be technician installed on the premises or customer installed. QT-50 also may be installed permanently at the customer premises on a dedicated PC.

JDSU Services

Fiber Characterization

The JDSU Fiber Characterization Service verifies the integrity and capacity of your fiber plant through the measurement of key fundamental properties, such as attenuation, reflectance, and dispersion. Comprehensive testing, using industry-leading JDSU optical test equipment, is performed by expert technical engineers and administered by a dedicated project manager. Whether you are increasing the speed or density of traffic on your existing network or you wish to verify the quality of a fiber installation prior to deployment, the information provided in our comprehensive report will allow you to properly plan for current and future network deployments.

Product Support Services

A single source for maintaining quality and improved management

- *Extended Warranty* – Options include extending the standard warranty of a product or purchasing additional coverage for products with expired warranties. Also, extended warranties for a group of test instruments can be prorated so warranties expire at the same time.

- *Calibration and Calibration Management* – ISO-certified on-site or return-to-factory calibration of instruments provides a convenient, one-stop solution for all calibration and calibration management requirements.

- *Repair* – A group of strategic partners provides repair and repair management services for test equipment and general instrumentation products used to support networks, establishing confidence that all provided services conform to quality and accountability standards.

- *Asset Management* – The use of asset management software, RFID, bar-coding, and on-site services make trackinequipment and managing staff more efficient and effective.

Consulting Services

Turnkey communications test solution

Staff and technical support for all aspects of network and services communications testing provide additional resources and expertise.

Education Services

Workforce development and technical training

Education Services include a wide array of courses ranging from product training to fundamentals and test applications. Classes guarantee staff will gain job skills and technical knowledge that improve on-the-job performance. Course formats include public training, on-site training, virtual classroom, and self-paced training.

Test Automation

Improved effectiveness and accuracy

Custom test automation software streamlines methods and procedures and allows testing to be performed more efficiently and with fewer resources.

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