



100G Multirate Module MU100011A

Network Master Pro
MT1000A

Anritsu Network Master Series

Solution for both Legacy and Carrier Ethernet Network

All-in-One Transport Tester
1.5 Mbps ~ 100 Gbps x 4 ports

Network Master Flex MT1100A



Network Master Flex
MT1100A



All-in-One Handy Tester
1.5 Mbps ~ 10 Gbps x 2 + **25/100 Gbps**

Network Master Pro MT1000A

New



- All test functions for carrier-class Ethernet commissioning and troubleshooting (I&M) tests (RFC6349, RFC2544, ITU-T Y.1564, Ethernet OAM, etc., network evaluations)
- Sync Ethernet tests and analyses, including SyncE and PTP
- Supports CPRI/OBSAI
- Supports optical fiber tests (OTDR, etc.)
- Easy-to-use GUI plus compact and light-weight design with battery operation
- WiFi and Bluetooth connections
- PDF and XML reporting functions

MT1000A Module Lineup

MU100011A: 100G Multirate Module *1



Up to 100 Gbps Transport testing

Single port: 16/25/40/100 Gbps (CFP4, QSFP+, QSFP28, SFP28)

2 ports: Up to 10 Gbps (SFP/SFP+, RJ45)

Supports the newest 25G Single Mode Fibre.

MU100010A: 10G Multirate Module



Up to 10 Gbps Transport testing

2 ports: 1.5 Mbps to 10 Gbps

(RJ45, SFP+/SFP, RJ48, BNC, BANTAM)

(OTN, Eth, SDH/SONET/PDH/DSn, CPRI, FC)

MU10002xA: OTDR Modules



OTDR Module

MU100020A 1310/1550nm SMF

MU100021A 1310/1550/850/1300nm SMF/MMF

MU100022A 1310/1550/1625nm SMF

MU100090A: GPS Disciplined Oscillator *2



PTP Module

Timing: Selectable from Rubidium and GPS clocking

MU100040A: CPRI RF Module



CPRI RF spectrum testing Module

2 ports: Up to 9.8 Gbps

MT1000A: Mainframe

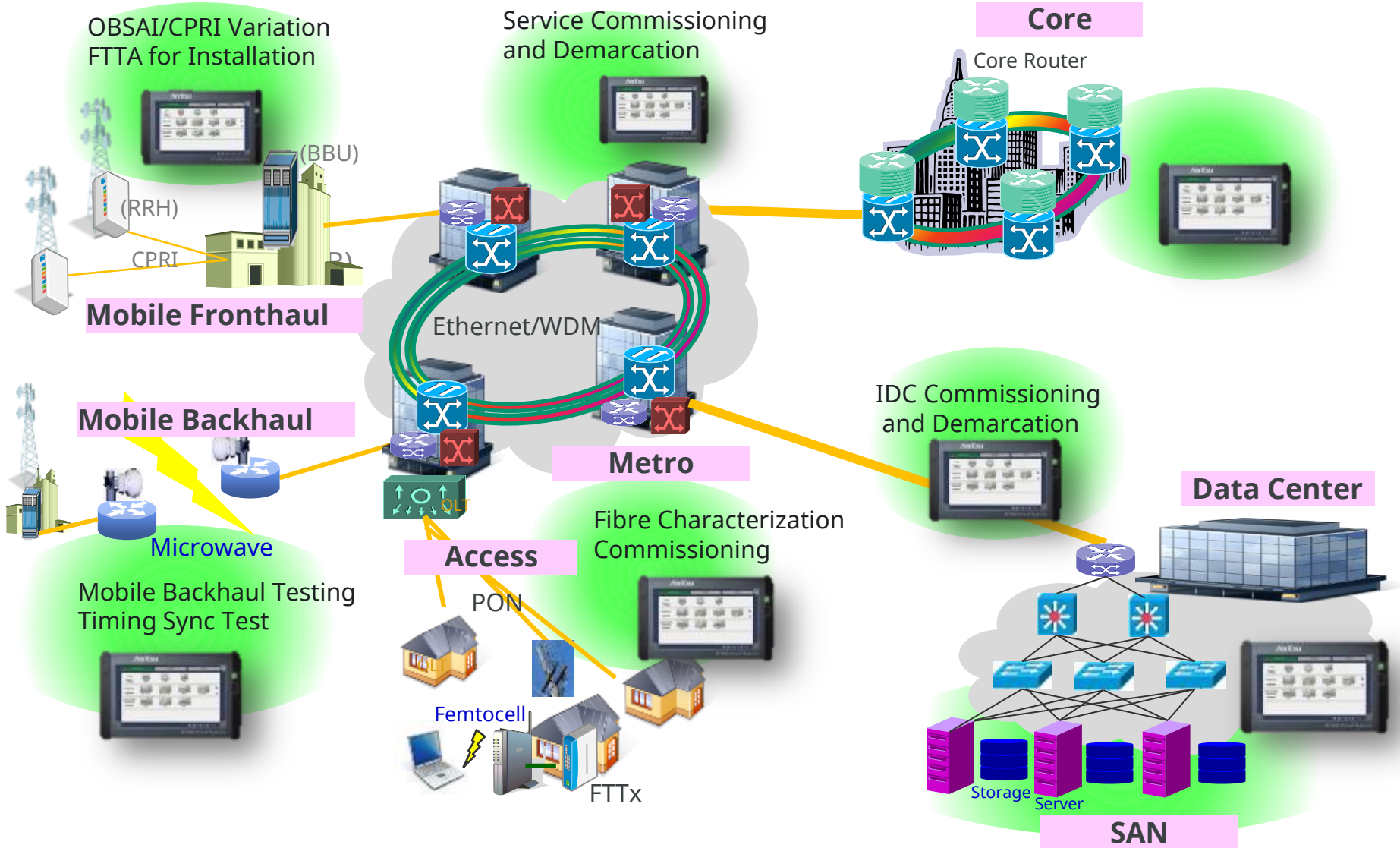


*1: Requires MT1000A-006

*2: Requires MT1000A-005



MT1000A Covers Everywhere

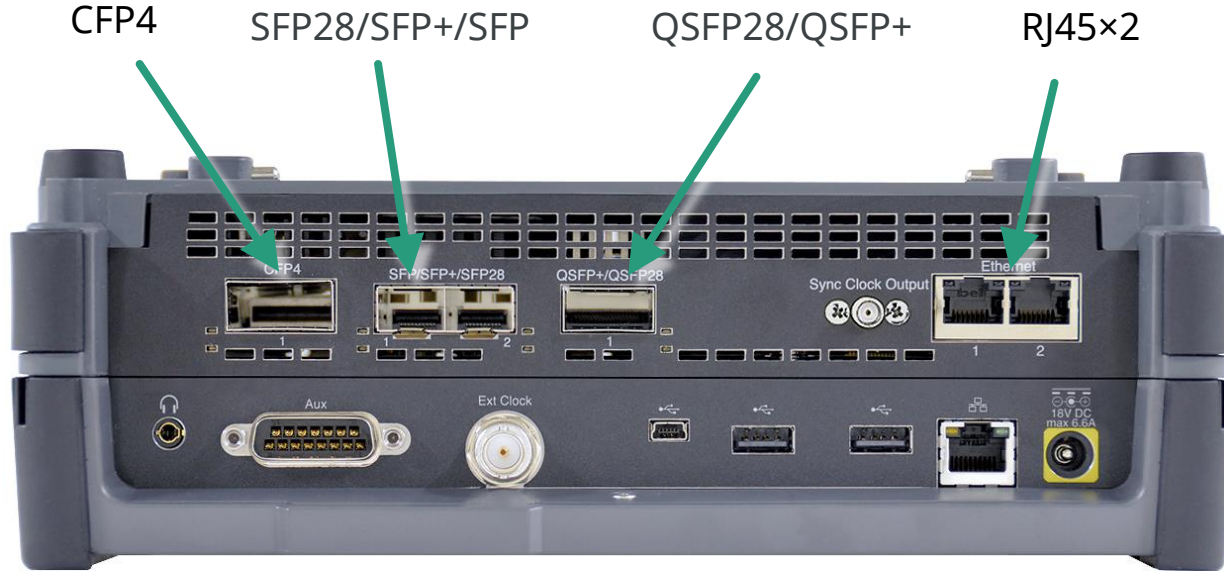


MT1000A Key Applications



- Carrier Class Ethernet and DCI I&M, and Troubleshooting
 - Ethernet testing 10 Mbps to 100 Gbps (including 25GBASE-SR/LR)
 - 25GigE and 100GigE RS-FEC
 - RFC 2544 commissioning test and Y.1564 service activation test
 - RFC 6349 (up to 10 Gbps)
 - Ethernet OAM
 - MPLS-TP and PBB
 - IP Channel statistics (up to 10 GigE)
 - Ethernet Frame capture for advanced troubleshooting
 - Up to 16G Fibre Channel including RFC2544 and credit buffer optimization
- Core and Metro Networks I&M
 - OTN up to OTU4 including mapping of Ethernet/SDH/SONET/Fibre Channel client signals, multistage mapping, FEC (Forward Error Correction)
 - Testing and verification of OTN functions: ODU0, ODU2e and ODU4
 - Testing and verification of SDH/SONET interfaces to standards
- Mobile Backhaul Installation and Verification
 - Synchronous Ethernet testing up to 10 GigE (SyncE and IEEE 1588 v2)
 - Time Error measurement (ITU-T G.827x)
- Mobile Fronthaul Installation and Verification
 - CPRI testing up to 10.3 Gbps
 - OBSAI testing up to 6 Gbps

MU100011A 100G Multirate Module Interfaces



Interface	Ethernet	OTN	SDH/SONET	Fibre Channel	CPRI/OBSAI
CFP4	100GbE	OTU4	-	-	-
QSFP28	100GbE	OTU4	-	-	-
QSFP+	40GbE	OTU3	-	-	-
SFP28 /SFP+/SFP	25GbE /10GbE/GbE	OTU2x /OTU1x	STM1 to 64 OC-3 to 192	1 to 16G FC	CPRI 1/2/3/4/5/6/7/8 OBSAI 1x/2x/4x/8x
RJ45	10/100 /1000M	-	-	-	-

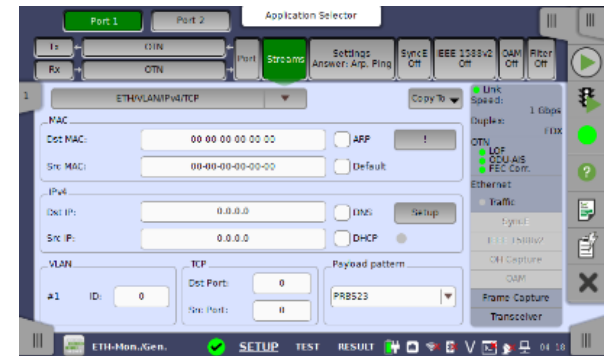
MT1000A Ethernet Test Functions

- Ethernet Test Solution Functions



- Ethernet testing at up to 100 Gbps
- Ethernet testing at 25 Gbps
- Traffic generation up to full line rate
- Generate and Measure FEC 25/100GbE
- Supports IPv4 and IPv6
- Ethernet Service Activation Test (Y.1564)
- RFC 2544 testing
- TCP Throughput option (RFC 6349) *1
- BER Testing
- Service disruption measurement
- Comprehensive statistics
- Filters – to extract relevant parts of traffic
- Thresholds – to highlight abnormal situations
- Simultaneous monitoring of both line directions
- IP Channel Statistics to identify error streams, top talkers, network attacks for up to 230 multiflow counters *1
- Ethernet OAM: IEEE 802.3 (IEEE 802.3ah), IEEE 802.1ag, ITU-T Y.1731

- Synchronous Ethernet Test (G.826x, IEEE 1588 v2 and G.8275.1)
- Ethernet Multistreams: Up to 16 streams per port
- Stacked VLAN (Q-in-Q): Up to 8 levels of VLAN tags
- MPLS/MPLS-TP testing: Up to 8 levels of MPLS labels
- PBB testing
- 10G WAN PHY
- Ping/Traceroute test
- Electrical cable test and optical signal level indication
- Frame capture for protocol analysis by Wireshark®



*1 Up to 10GbE

Realistic Eth TCP Connection Test within RFC 6349

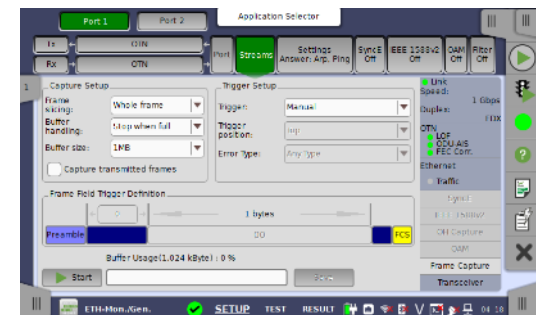
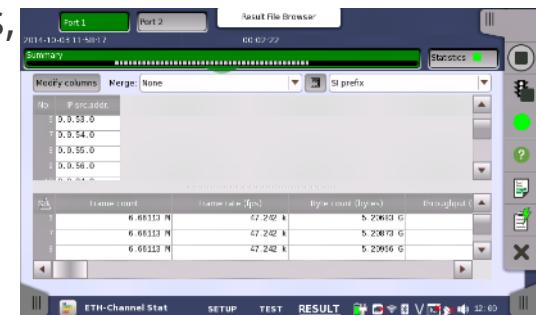
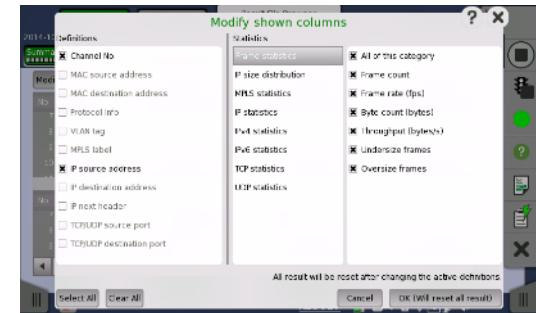
- Supports TCP throughput optimization by performing test based on RFC 6349*¹ in addition to RFC 2544 and ITU-T Y.1564
- Bi-directional RFC 6349 test emulates realistic TCP connections by testing both directions simultaneously
- Simultaneously tests multiple TCP connections for maximum throughput
 - Extra Anritsu function and not part of RFC6349 standard



*1: RFC6349 is available up to 10GbE

Deepest Eth Traffic Monitoring and Capturing Functions

- IP Channel Statistics *1
 - Filter combinations
 - IPv4, IPv6 or MAC address, VLAN ID or MPLS label, IP next header (protocol), TCP/UDP ports
 - Monitoring values
 - Frame counts/rate, Throughput, Error frames, Size distribution, IPv4/IPv6 statistics, TCP/UDP statistics, etc.
 - Added value of IP Channel Statistics
 - VLAN scan
 - Throughput per VLAN ID monitored by selecting VLAN ID as filter
- WireShark® Capture
 - Full-line-rate capture at all interfaces
 - Pre-filter and Filter on frame
 - Capture Ethernet frames over OTN
 - View capture at tester or export to PC



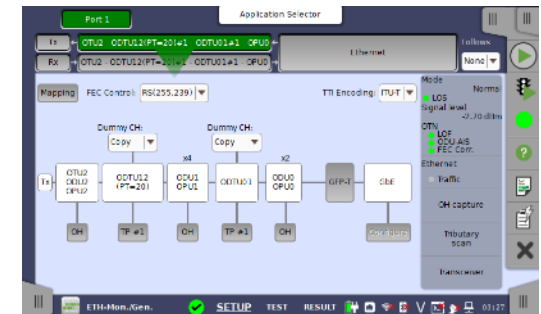
*1: IP Channel Statistics is available up to 10GbE

MT1000A OTN Test Functions

- Comprehensive OTN Testing for Metro and Core Network I&M



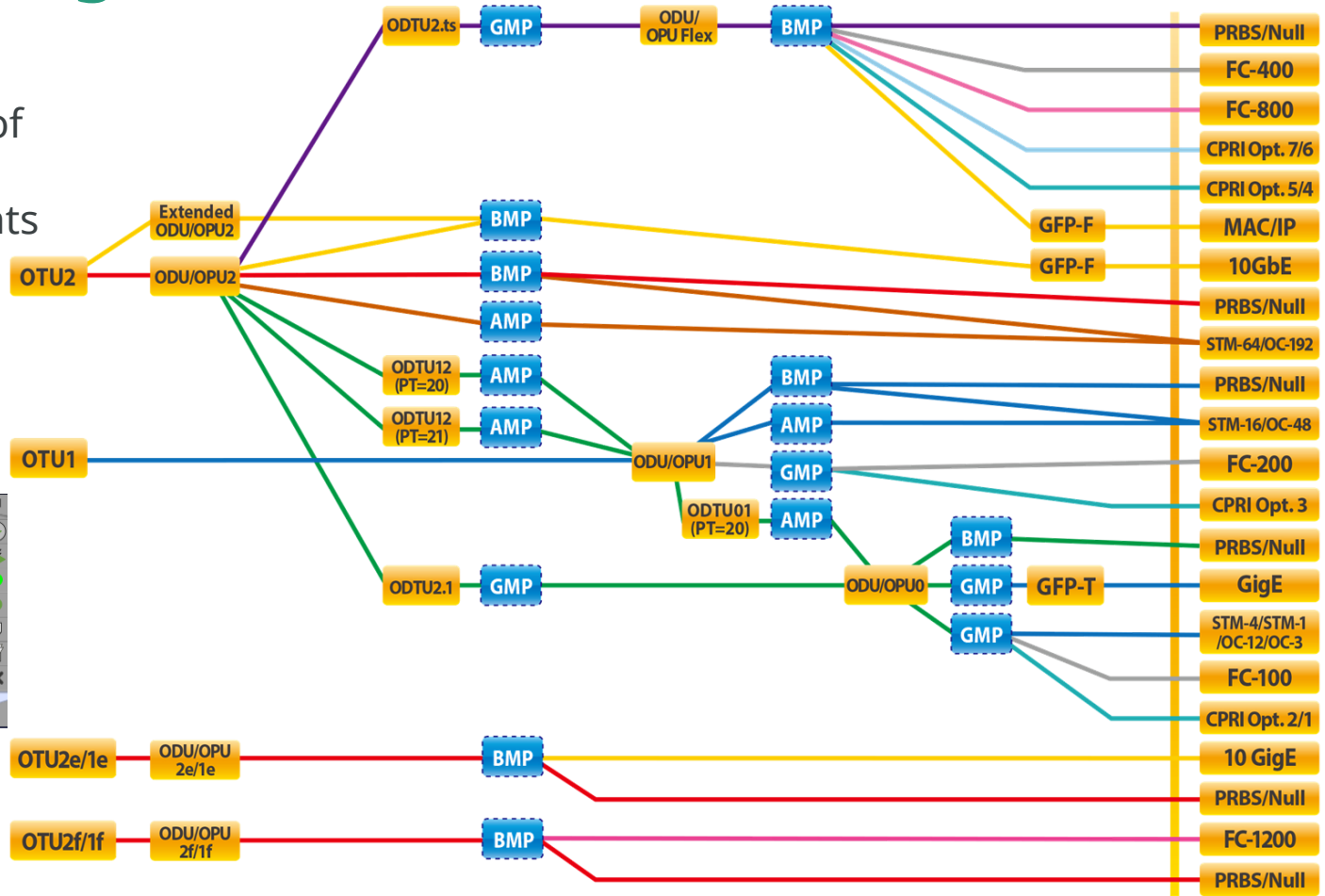
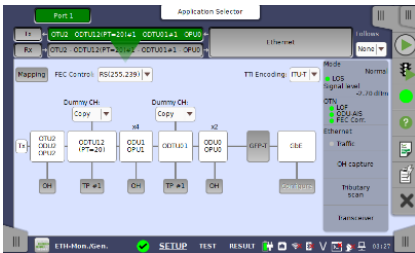
- OTU1, OTU2, OTU3, OTU4, OTU1e, OTU2e, OTU1f, OTU2f, OTU3e1, OTU3e2 tests
- ODU0, ODUflex^{*1}, ODU1, ODU2, ODU3, ODU4 ODU0 to ODU4 multistage mapping
- Test Ethernet, CPRI, Fibre Channel and SDH/SONET client signals mapped to OTN signal
- OTN tests with bulk signals at OTN level
- Comprehensive OTN error and alarm statistics
- OTN error performance measurement (G.8201 or M.2401)
- ITU-T O.182-compliant FEC test
- Delay measurement
- OTN header edit and capture
- OTN TCM monitoring and generation
- Service disruption analysis using APS application



*1 Up to OTU2

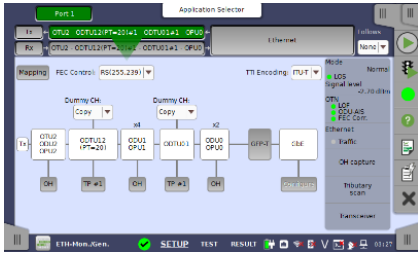
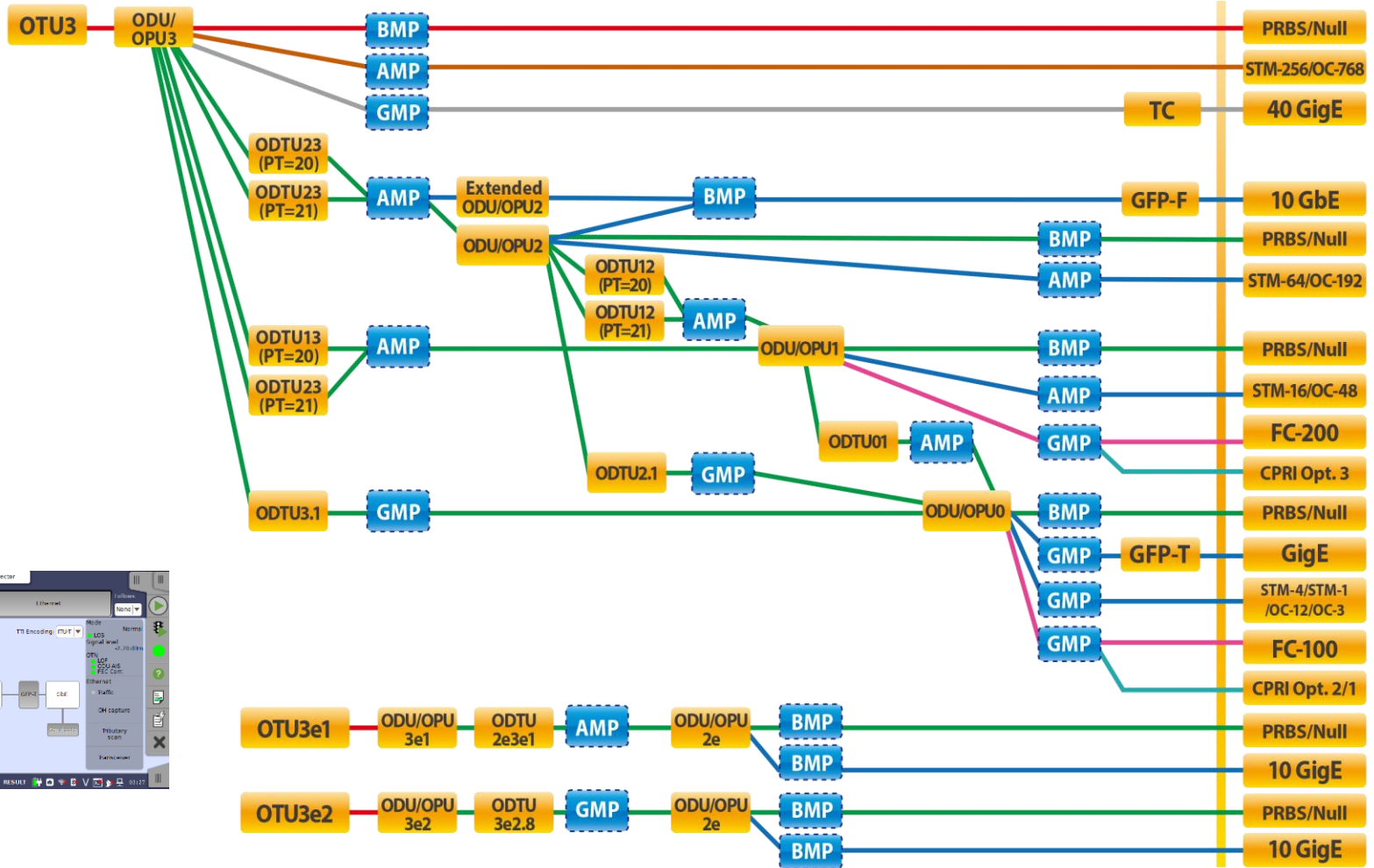
OTN Mapping OTU1/OTU2

- Largest Range of Mappings and Supported Clients



- MU100010A-001 Up to 2.7G Dual Channel
- MU100011A-001/003 Up to 10G Single/Dual Channel
- MU100010A-011/012 Ethernet 10G Single/Dual Channel
- MU100011A-001/003 Up to 10G Single/Dual Channel
- MU100010A-051/052 OTN 10G Single/Dual Channel
- MU100011A-001/003 Up to 10G Single/Dual Channel
- MU100010A-081/082 STM-64 OC-192 Single/Dual Channel
- MU100011A-001/003 Up to 10G Single/Dual Channel
- MU100010A-091/092 FC 8G 10G Single/Dual Channel
- MU100011A-004/005 Up to 10G FC Single/Dual Channel
- MU100010A-002 FC 1G 2G 4G Dual Channel
- MU100011A-004/005 Up to 10G FC Single/Dual Channel
- MU100010A-061 ODU Multiplexing
- MU100011A-063 ODU Multiplexing/Multi Stage
- MU100010A-062 ODU Flex
- MU100011A-062 ODU Flex
- MU100010A-071 CPRI/OBSAI Up to 5G Dual channel
- MU100011A-071/072 CPRI/OBSAI Up to 10G Single/Dual channel
- MU100010A-072/073 CPRI/OBSAI 6G to 10G Single/Dual channel
- MU100011A-071/072 CPRI/OBSAI Up to 10G Single/Dual channel

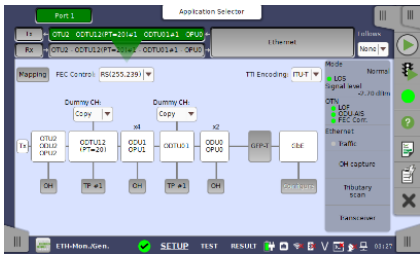
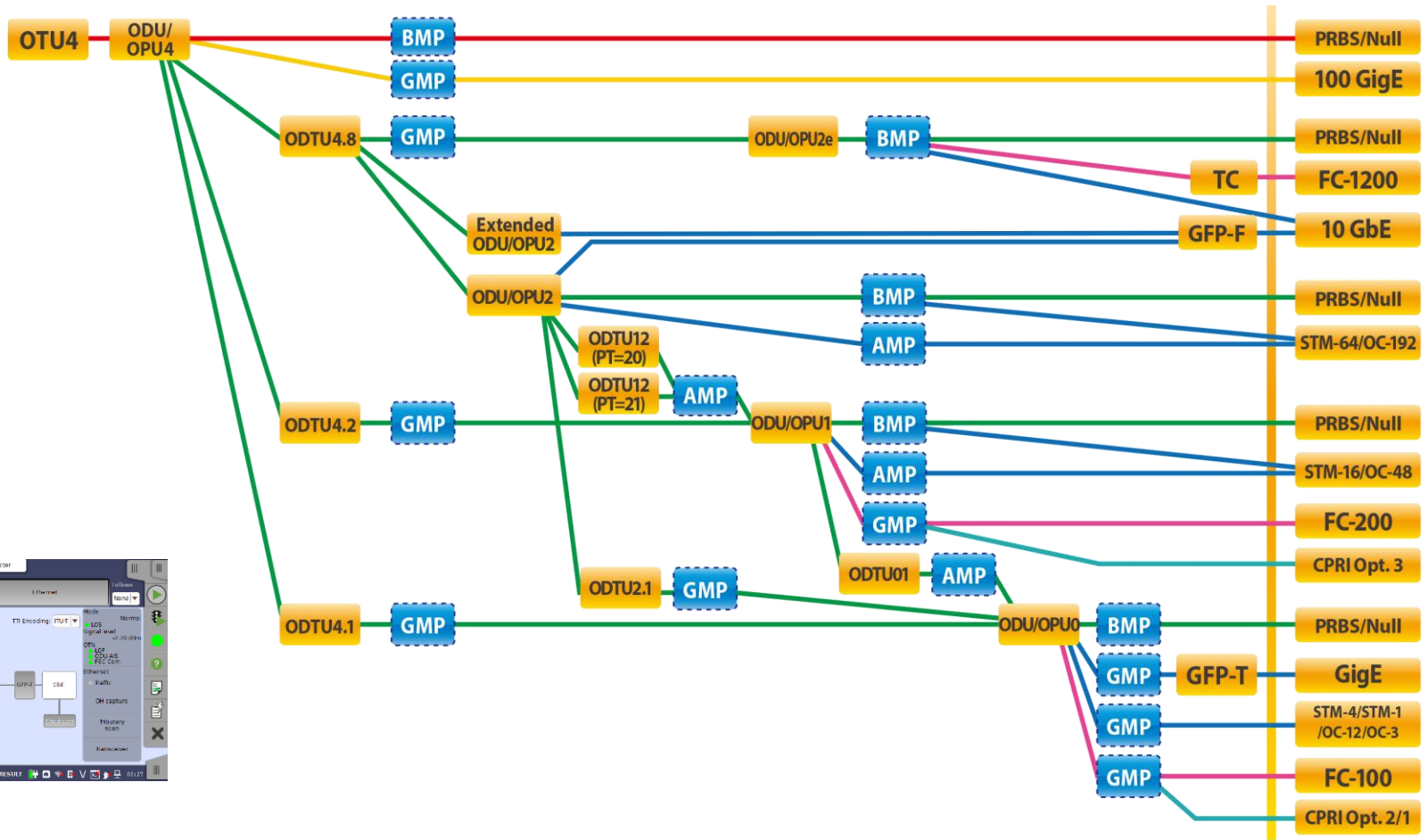
OTN Mapping OTU3



- MU100011A-053 OTN 40 Gig Single Channel
- MU100011A-063 40/100G ODU Multistage
- MU100011A-001/003 Up to 10G Single/Dual Channel

- MU100011A-004/005 Up to 10G FC Single/Dual channel
- MU100011A-071/072 CPRI/OBSAI Up to 10G Single/Dual Channel
- MU100011A-013 Ethernet 40G Single Channel
- MU100011A-083 STM-256 OC-768 Single Channel

OTN Mapping OTU4



- MU100011A-055 OTN 100G Single Channel
- MU100011A-063 40/100G ODU Multistage
- MU100011A-001/003 Up to 10G Single/Dual Channel

- MU100011A-004/005 Up to 10G FC Single/Dual Channel
- MU100011A-071/072 CPRI/OBSAI Up to 10G Single/Dual Channel
- MU100011A-015 Ethernet 100G Single Channel

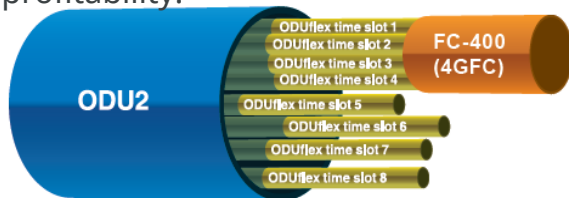
OTN Client Signal Analysis

- OTN Mappings
 - Added new evolving ODUflex and ODU multiplexing mapping technologies to support more flexible client signal transmissions
 - Supports both ODUflex and ODU multiplexing for flexible configuration of customer's test environment

ODUflex ...

... is a new OTN feature supporting flexible allocation of client-signal bandwidth to make best use of OTN capacity.

By using this technology operators can make effective use of existing network capacity to offer services to end users and improve profitability.



The ODUflex Option divides the ODU2 capacity into eight 1.25G ODUflex time slots. In the above example, an FC-400 (4GFC) Fibre Channel signal occupies 4 ODUflex time slots.

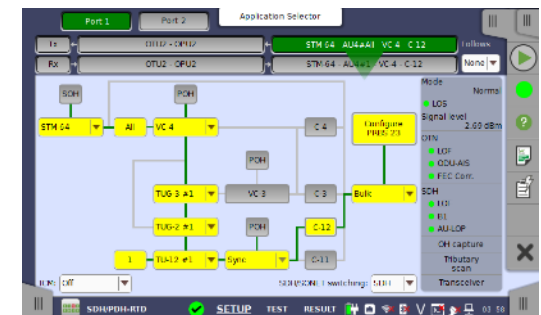
MT1000A supports rich client payload analysis and ODUflex



MT1000A

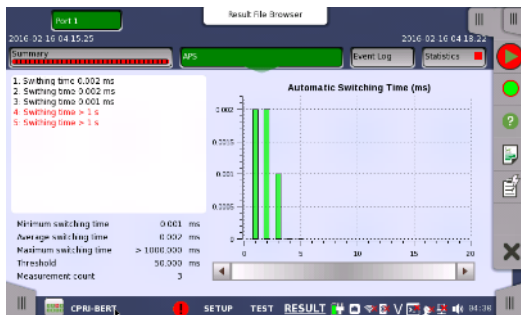
MT1000A SDH/SONET Test Functions

- Quick and Easy SDH/SONET/PDH/DSn Tests
 - Testing SDH/SONET systems at STM-64/STM-16/STM-4/STM-1/OC-192/OC-48/OC-12/OC-3/STS-3, and embedded PDH (E1/E3/E4) and DSn (DS1/DS3) systems
 - Simultaneous bi-directional monitoring of SDH/SONET lines
 - Comprehensive error and alarm statistics
 - G.826/G.828/G.829/M.2100 error-performance measurements on SDH/SONET traffic
 - SDH/SONET OH byte testing and monitoring
 - SDH/SONET trouble scan
 - SDH/SONET pointer event generation and monitoring
 - SDH/SONET delay measurements



MT1000A CPRI/OBSAI Test Functions

- 8 CPRI Rates Including Option 8
 - 10.138 Gbps
- 4 OBSAI Rates Including
 - 6.144 Gbps
- Simultaneous Dual-Port Testing
 - Shorter installation times
- Test Contents:
 - Alarm/Error monitoring and injection
 - Passive Link connection (CPRI)
 - Through mode monitoring
 - L1 and L2 BERT
 - L1 delay
 - APS measurement (CPRI)



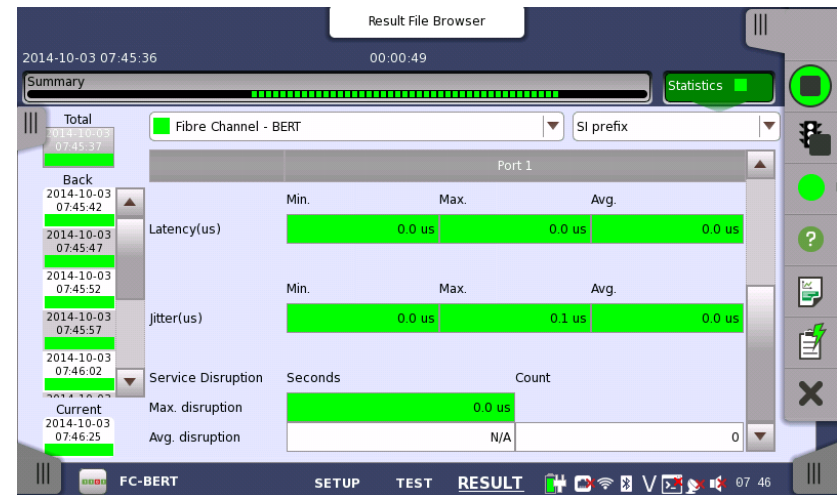
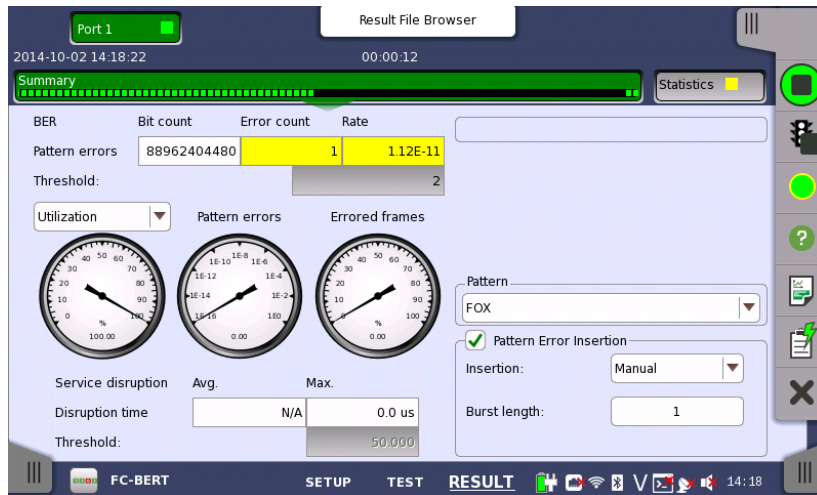
Supported OBSAI Rates	
Bit Rate (Gbps)	Line Code
0.768	8B/10B
1.536	8B/10B
3.072	8B/10B
6.144	8B/10B

Supported CPRI rates		
Option	Bit Rate (Gbps)	Line Code
1	0.6144	8B/10B
2	1.2288	8B/10B
3	2.4576	8B/10B
4	3.0720	8B/10B
5	4.9152	8B/10B
6	6.1440	8B/10B
7	9.8304	8B/10B
8	10.1376	64B/66B

MT1000A Fibre Channel Functions

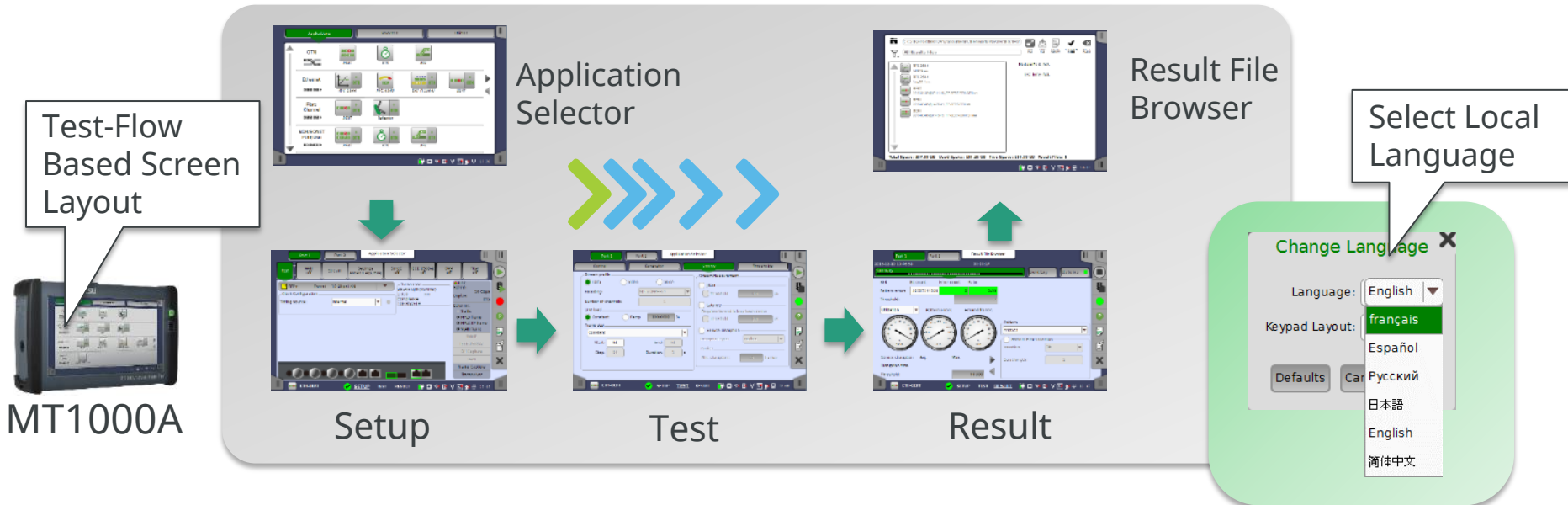
- Powerful Tests of Fibre Channel Links

- Tests for 1 GFC, 2 GFC, 4 GFC, 8 GFC, 10 GFC and 16 GFC
 - Optional mapping to OTN
- Latency/jitter measurement
- BER testing including service disruption measurement
- Line alarm and error monitoring
- RFC 2544-like benchmarking for credit buffer analysis
- Reflector mode



Easy GUI with Intuitive Layout & No Deep Levels

- Largest Display in Class
- Easy Operability
 - Network I&M tests require easy-to-use instruments for configuring and running tests quickly
 - Simple and intuitive GUI supports easy and fast testing
 - No hard-to-use deep menu levels
 - Very low learning curve helps even inexperienced users start testing quickly and efficiently

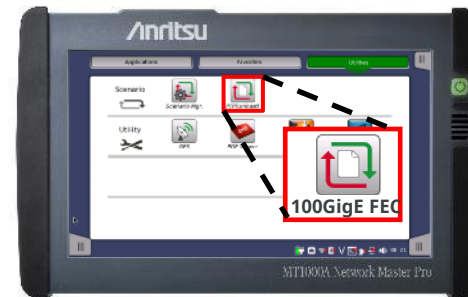
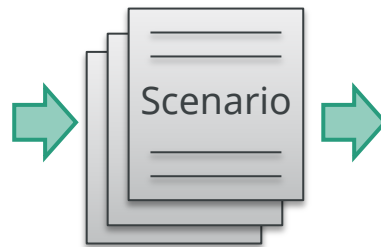


GUI Process Automation — One-Button Test Function

- One-Button Testing

- Executing scenario containing predetermined test set simplifies complex setup and repeat testing

MX100003A SEEK Scenario Edit Environment Kit



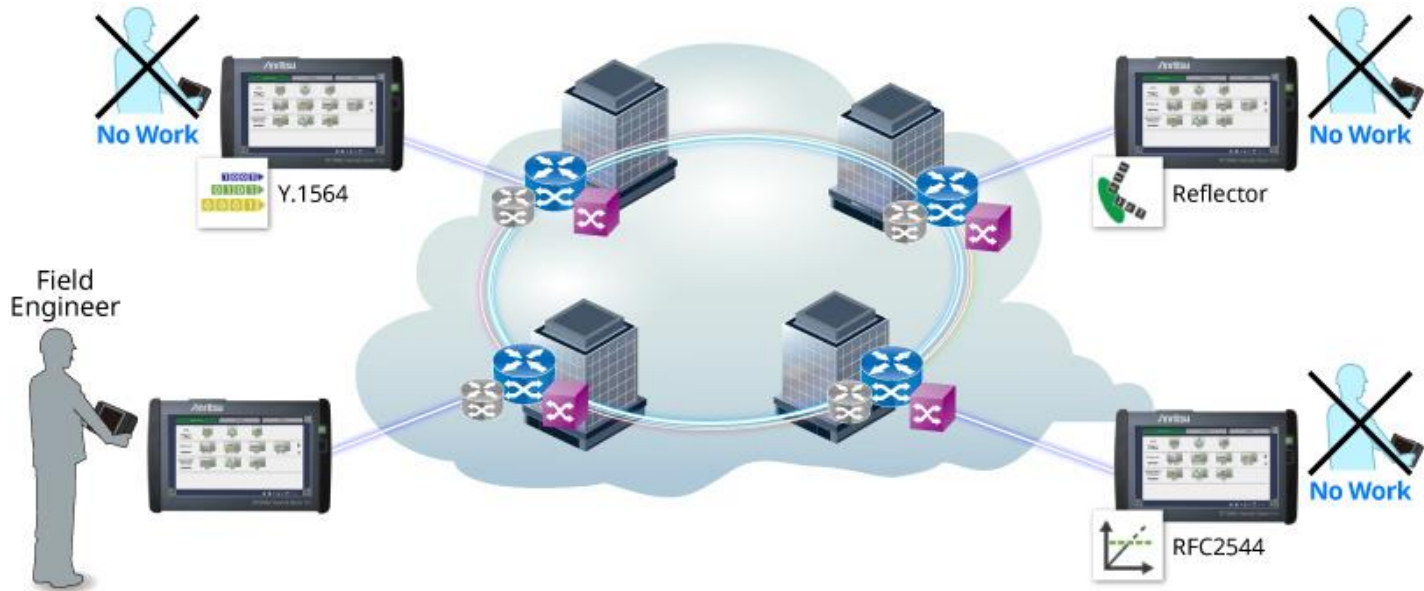
- ✓ Create scenarios using drag and drop dedicated GUI
- ✓ At-a-glance results with Pass/Fail evaluation
- ✓ Support complex processes and tests using SCPI commands

- ✓ One-button testing after loading scenario into MT1000A
- ✓ Output results saved in MT1000A for analysis

Network Discovery and In-band Control

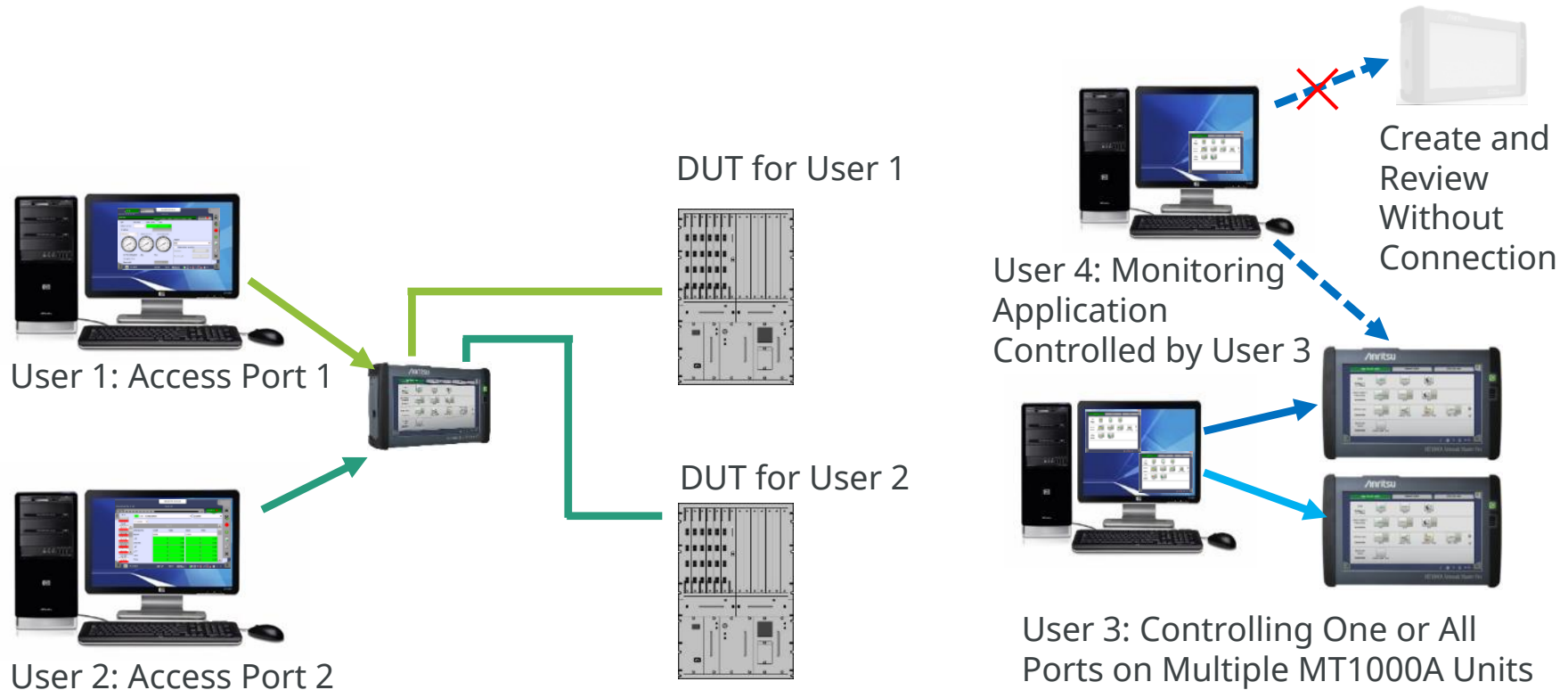


- No Need for Two Engineers for End-to-end Test
 - One engineer controls both local and remote testers without dedicated LAN for remote access
 - Testing from one end cuts OPEX
- Process
 - Discover other "Network Master(s)" on network
 - Remote-control far-end tests, such as RFC2544, Y.1564, Reflector (L2/L3/L4 loopback) etc.
 - Generate report at local controller with results summarized at both local and remote testers



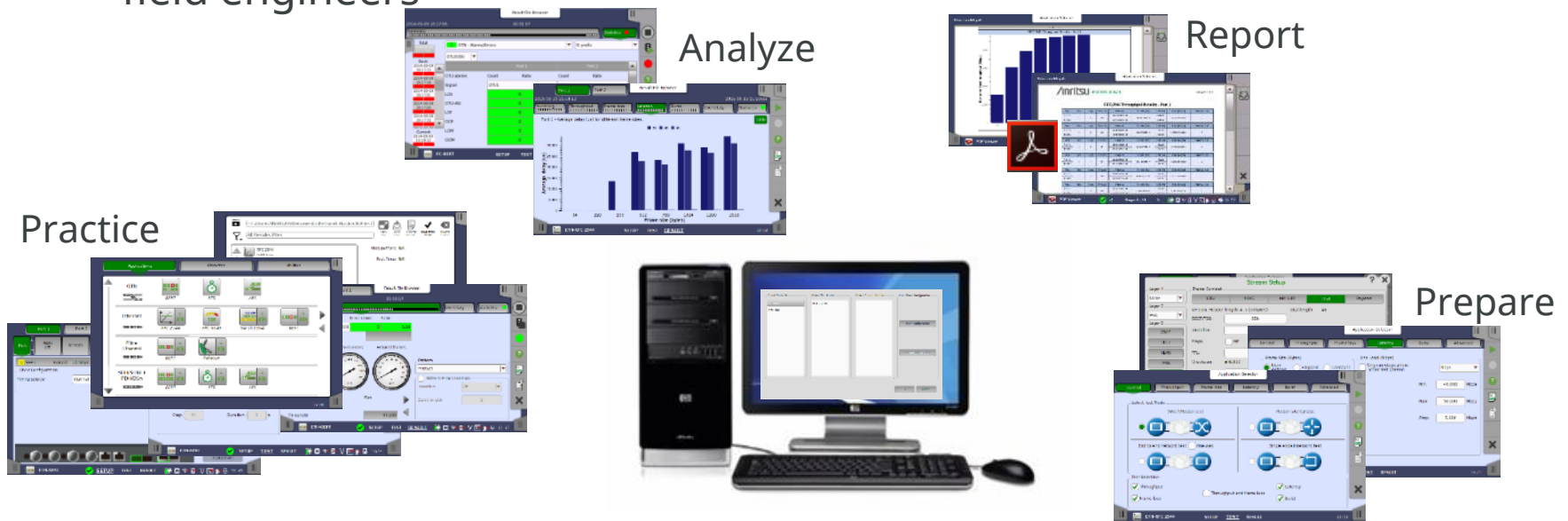
Full Remote Control Software for PCs

- Control software for Windows 7/8/8.1
- Multiple users share same MT1000A via separate ports
- Long-term remote monitoring and operational control, including booting, operation, file transfers, and firmware updates



Offline Analysis and Test Configuration

- Unique MX100001A Editor standalone PC software tool for:
 - Training users without physical tester
 - Analysing test data and creating PDF reports
 - Loading file from engineer in field and creating new report without tester
 - Preparing test cases with detailed configuration and distributing to field engineers



- Lower CAPEX and simpler management because no requirement for extra testers to create and review configurations and results (**all from PC**)

Optical Transceiver Analysis



- Quick Diagnostics by Accessing Control Registers
 - MDIO (CFP4), I2C (QSFP+, QSFP28) access
- MDIO/I2C Analysis
 - Transceiver information display
 - Alarm, Wavelength, Bit rate, Compliance, Vendor information
 - Output control
 - Power monitor
 - MDIO/I2C Read/Write
- CAUI4 Electrical Interface Control
 - Attenuation, Pre-Emphasis, RX Equalizer

