VIAVI Solutions

Brochure

VIAVI

T-BERD/MTS-5800 Platform

Easy Remote Testing of Radiohead Operation with CPRI and OBSAI

With the current mobile backhaul transition to small-cell deployments, field technicians (of service providers and wireless NEM contractors) must verify and install CPRI/OBSAI links between the remote radio head (RRH) and baseband unit (BBU). Applications range from verifying connectivity, emulating the CPRI/OBSAI protocol, and installing links to troubleshooting CPRI connectivity and ensuring there are no code violations, BER errors, and/or framing issues.

The T-BERD/MTS-5800 is a portable field test instrument capable of testing CPRI/OBSAI transport links. CPRI and OBSAI test options save hours of troubleshooting by enabling installation with BER testing and performing link delay measurements, thereby ensuring proper handoffs for time-sensitive and service-critical applications such as LTE.

- Customers can lower CapEx with a modular, field-upgradeable tester that can seamlessly expand to future technologies like CPRI/OBSAI and the existing Ethernet backhaul technologies like Ethernet, Ethernet OAM, PDH, 1588v2/PTP, and SyncE.
- To promote an efficient service and network-management life cycle, the solution integrates installation tools and advanced troubleshooting analysis in a single test instrument.
- A modular backplane allows you to upgrade the T-BERD/MTS in field with additional functionality for OTDR, COSA or Timing/Synchronization measurements.
- T-BERD/MTS is the leading field network installation platform for 614M Mbps to 10137 Mbps CPRI and 768 Mbps to 6144 Mbps OBSAI interfaces.

Key Features

- Integrates installation tools and advanced troubleshooting analysis in single test instrument
- enables upgrading in-field with functionality for OTDR, COSA or Timing/Sync measurements
- Leading field network install platform for 614M Mbps to 10137 Mbps CPRI and 768 Mbps to 6144 Mbps OBSAI interfaces
- Verifies CRAN networks carrying CPRI/OBSAI over dark fiber or xWDM links over several miles with BER and roudtrip delay tests in CPRI/OBSAI
- Verify RRH remotely with CPRI/OBSAI layer 2 frame sync and roundtripdelay measurements
- Troubleshoot CPRI/OBSAI links between BBU and RRH by monitoring CPRI links in both directions

Key Benefits

- Lower CapEx with tester that easily expands for new tech like CPRI/OBSAI and existing Ethernet backhaul tech like Ethernet, Ethernet OAM, PDH, 1588v2/PTP, and SyncE
- Avoid costly tower climbs and sector swap problems by identifying the serial number of RRH, RRH SFP's and other information on status of RRH
- Simplify installation tests with user-guides thru test steps and summary info to quickly validate test results
- Identify PIM or interference issues from remote locations by performing spectral analysis on CPRI signals
- Promotes efficient service and network-management life cycle

- The CPRI/OBSAI test application verifies the functions of CRAN networks carrying CPRI/OBSAI over dark fiber or xWDM links over several miles by performing BER and roundtrip delay tests in CPRI/OBSAI signals.
- These test applications allow verification of RRH from remote locations by performing CPRI/OBSAI Layer 2 frame sync and roundtrip delay measurements.
- These test applications allow troubleshooting of CPRI/OBSAI links between BBU and RRH by monitoring CPRI links in both directions.
- The RRH testing suite permits customer to avoid costly tower climbing and sector swapping problems by identifying the serial number of RRH, the RRH SFP's and many other information regarding the status of the RRH.
- The RFoCPRI application enables users to identify PIM or interference issues from remote locations by performing spectral analysis on CPRI signals.
- CPRI Check simplifies installation tests by guiding the user through various test steps and displaying summary information to quickly validate the test results.

Ready for 4G/LTE

To meet the 4G/LTE networks spectral-efficiency and power-budget requirements, operators are deploying smaller microcell and picocell antennas, assigning fewer subscribers per sector, and building smaller sector sizes to reduce power consumption, improve mobile coverage, and reduce the equipment footprint compared to traditional base-station (macrocell) deployments.

Not Just Another Throughput Test

This T-BERD/MTS solution is specifically designed for installing and verifying CPRI/OBSA links for small-cell deployments. More specifically, installation and maintenance of CPRI/OBSAI links is performed by BER and delay tests.

Use Cases

This T-BERD/MTS solution is specifically designed for installing and verifying CPRI/OBSA links for small-cell deployments. More specifically, installation and maintenance of CPRI/OBSAI links is performed by BER and delay tests.

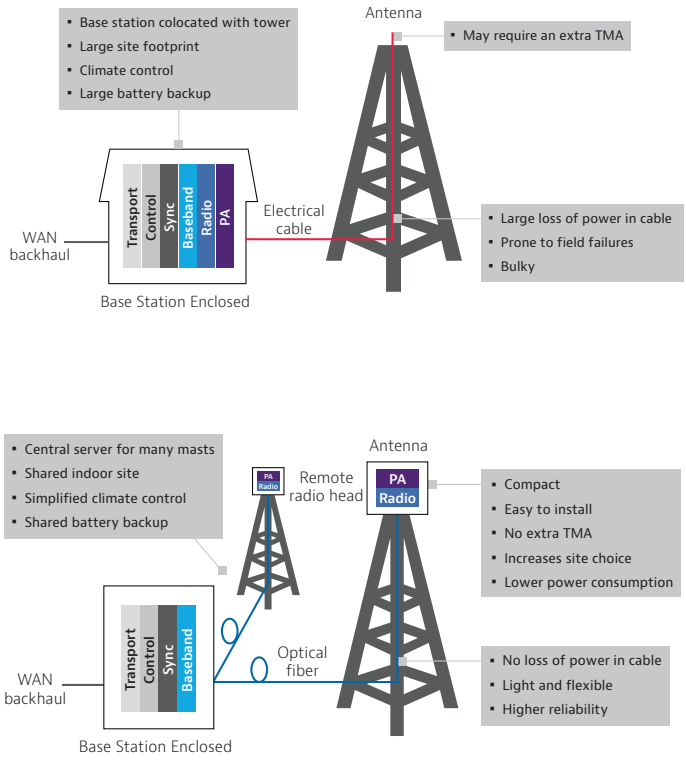
- Installing CRAN networks between RRH and BBU over dark fiber or xWDM links
- Monitoring and troubleshooting CPRI/OBSAI links between RRH and BBU
- Verifying PIM and Interference issues from remote locations
- Testing RRH and SFP's without climbing a tower

Fiber to the Antenna (FTTA)

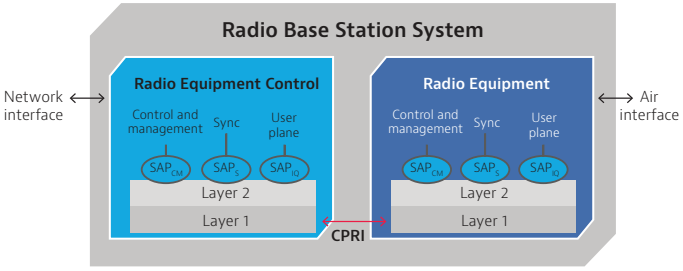
This architecture consists of RRH's at the cell site connected to BBU's via protocols such as CPRI and/or OBSAI. Connections between RRHs and BBUs can be single fibers, pairs of fibers with active DWDM/CWDM components, and even over OTN depending on the actual access network and fiber in the network. Functional distances can range from 100 meters to tens of kilometers. A well-implemented and optimized ODAS architecture can dramatically reduce overall system, deployment, and operational costs.

CPRI/OBSAI Standards

CPRI and OBSAI standards work to effectively digitize RF signals. They help service providers deploy smaller antennas on the sides of buildings or light poles while collocating controller logic and functions at sites such as the Cos/MSC and collocation hotels. One CPRI standard defines interface rates up to 24.3 Gbps to enable various future LTE channel mappings. This lets service providers initially deploy lower interface rates and then upgrade their networks as bandwidth requirements grow.



Traditional and FTTA Design



DAS Architecture > CPRI Interface

CPRI/OBSAI interface rates

CPRI Rates	OBSAI Rates
614.4 Mbps (1x)	
	768 Mbps (1x)
1228.8 Mbps (2x)	
	1536 Mbps (2x)
2457.6 Mbps (4x)	
3072.0 Mbps (5x)	3072 Mbps (4x)
4915.2 Mbps (8x)	
6144.0 Mbps (10x)	6144 Mbps (8x)
81110 Mbps (16x)	
9830.4 Mbps (16x)	
10137.6 Mbps (20x)	

The feature set resembles TDM/PDH types of framing packaged into the 8B/10B-encoded Layer 1 frame (64B/66B-encoded for 8110/10137/24330 Mbps). While this Layer 1 and Layer 2 technology looks like Ethernet and fiber channel, the actual framing structure, and how the RF data is mapped into that framing structure, more closely resembles TDM/PDH technology.

T-BERD/MTS Features and Benefits

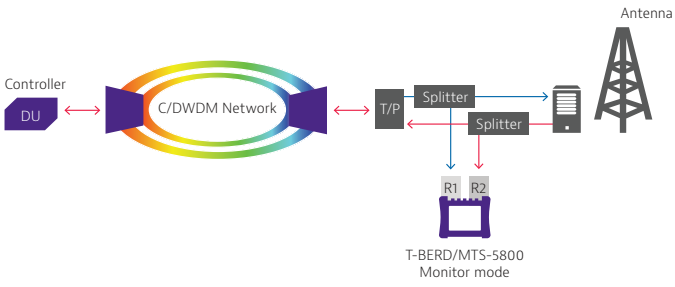
Feature	Description	Advantage	Benefit
Install 614 Mbps to 10137 Mbps CPRI links and 768 Mbps to 6.1 Gbps OBSAI links	Perform installation testing for CPRI/OBSAI links between the antenna and the controller	Verify the fiber, DWDM Clock recovery, and user data digitization at time of installation	Avoid expensive truck rolls to troubleshoot small-cell deployments as infrastructure goes live
Layer 2 BER testing	Perform BER testing using a test pattern emulates CPRI/OBSAI framing and traditional patterns	Ensure BER rate of 10^{-12} or better for Layer 2 emulated traffic	Verify that baseline error rates meet standards at time of installation ensuring the quality of subscriber traffic
Layer 2 delay testing	Measure delay between the antenna and the controller	Use the delay pattern to confirm that the installation meets requirements before making the system operational	Confirm that "cable" delay will support positioning services and strict timing requirements between the BBU and RRH so that users will not experience dropped calls
Monitor 614 Mbps to 10137 Mbps CPRI interfaces and 768 Mbps to 6.1 Gbps OBSAI interfaces	Monitor traffic, ensure no errors are occurring, and verify the receipt of correct framing and signal frequency	Monitor and troubleshoot with or without a splitter, thereby gaining access at various test points. Using a specific test pattern ensures that frames are received with proper CPRI/OBSAI framing without code violation (CV) and additional Layer 1 issues	Reduce the time required to resolve field problems by having the right tool that make Layer 2 CPRI framing problems visible
RRH Testing	Verify parameters of RRH	By verifying RRH parameters, problems such as wrong SFP or incorrect wiring of BBU to RRH ports can be prevented	Avoid tower climbs to check and swap SFP's plugged into the RRH. Prevent sector swapping
RFoCPRI Testing	Perform spectral analysis on CPRI links	Spectral analysis identifies PIM or interference issues that can be caused during the installation of coaxial connection between RRH and antennas or by external sources	Avoid tower climbs to verify PIM on coaxial connections. Verify interference from central office without dispatching a technician in the field

Installing CRAN Networks Between RRH and BBU

Cloud RAN (CRAN) networks are deployed between RRH and BBUs and use fiber, a DWDM network, or CPRI over OTN. To ensure that the RF signal is carried correctly (without errors), it is important to verify the link between the RRH and BBU. Proper verification requires testing optical power level, signal frequency, frame sync, Bit Error Rate and roundtrip delay.

Monitoring and Troubleshooting CPRI/OBSAI Links

Depending on fiber structure, a monitoring application may require a splitter. To troubleshoot a link between an RRH and BB, technicians need to configure the unit for Mon/Thru application and verify correct receipt of the signal. It is important to verify receipt of the CPRI/OBSAI frames without any code violations and additional 8/10b (or 64/66b) encoding errors. If additional test sets are available, technicians may need to verify delays at various points of the infrastructure, thereby ensuring that initial birth-certificate metrics have not deteriorated. Dual monitor applications require a T-BERD/MTS dual-port option.



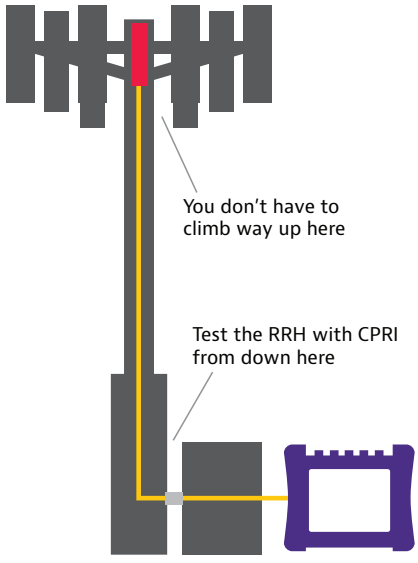
T-BERD/MTS testing of REC/RE link

Testing PIM and Interference from Remote Locations

Passive Intermodulation (PIM) and interference continue to represent major sources of problems in the field. Performing RFoCPRI allows users to verify PIM and interference from any location that provides access to a CPRI test port. T-BERD/MTS-5800 can be placed in monitor mode between RRH and BBU, and perform spectral analysis on Antenna Carrier channels (AxC) embedded in CPRI signals between RRH and BBU. The spectral analysis identifies PIM issues and interferers that can be caused by coaxial connections between RRH and antennas or by external sources.

Testing RRH and SFP without Climbing the Tower

Towers and rooftops carry an increasingly large number of RRH. For proper operations, they need to be properly powered, wired to correct BBU ports or xWDM transport equipment. Furthermore, they need to carry the correct SFP that supports the required power level, wavelength, signal frequency and transport protocol. RRH/SFP errors require expensive dispatch of crews certified to climb towers, and may lead to substantial delay in service roll out schedules. CPRI test verifies the proper operation from the bottom of the tower by emulating a BBU, establishing a CPRI frame sync with the radios, and measuring roundtrip delays. Furthermore, RRH serial numbers can be obtained to verify the proper wiring of RRH's to the correct BBU port and avoid sector swapping errors in service. By reading the RRH SFP data, any errors associated with incorrect configuration or operation of SFP can be identified.



Ordering Information*

Description	Products	Part Number
614 Mbps CPRI 614 Mbps CPRI field-upgrade option	T-BERD/MTS-5800	C5614MCPRI C5614MCPRI-U1
1.2 G CPRI 1.2 G CPRI field-upgrade option	T-BERD/MTS-5800	C512GCPRI C512GCPRI-U1
2.4 G CPRI 2.4 G CPRI field-upgrade option	T-BERD/MTS-5800	C524GCPRI C524GCPRI-U1
3 G CPRI 3 G CPRI field-upgrade option	T-BERD/MTS-5800	C53GCPRI C53GCPRI-U1
4.9 G CPRI 4.9 G CPRI field-upgrade option	T-BERD/MTS-5800	C549GCPRI C549GCPRI-UI
6.1 G CPRI 6.1 G CPRI field-upgrade option	T-BERD/MTS-5800	C561GCPRI C561G- CPRI-UI
9.8 G CPRI 9.8 G CPRI field-upgrade option	T-BERD/MTS-5800	C598GCPRI C598GCPRI-U1
10.1 G CPRI 10.1 G CPRI Field up- grade option	T-BERD/MTS-5800	C510GCPRI C510GCPRI-U1
768 Mbps OBSAI 768 Mbps OBSAI field-upgrade option	T-BERD/MTS-5800	C5768MOBSAI C5768MOBSAI-U1
1.5 G OBSAI 1.5 G OBSAI field-upgrade option	T-BERD/MTS-5800	C515GOBSAI C515GOBSAI-U1
3 G OBSAI 3 G OBSAI field-upgrade option	T-BERD/MTS-5800	C53GOBSAI C53GOBSAI-U1
6.1 G OBSAI 6.1 G OBSAI field-upgrade option	T-BERD/MTS-5800	C561GOBSAI C561GOBSAI-UI
RFoCPRI	T-BERD/MTS-5800	C5RFOCPRI C5RFOCPRI-U1

* All T-BERD/MTS units can be upgraded with these CPRI and OBSAI options.

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