CISCO SYSTEMS

Data Sheet

ONS RAN Service Module for the Cisco ONS 15454 SONET/SDH Multiservice Provisioning Platform

The ONS RAN Service Module (RAN-SM) for the Cisco® ONS 15454 SONET/SDH Multiservice Provisioning Platform (MPP) is designed to aggregate optimized RAN transport links in the Cisco IP RAN Optimization solution.

INTRODUCTION

Mobile operators face strong competitive pressure to differentiate their services, increase radio coverage and customer satisfaction, deliver innovative services, and achieve higher profits. Cisco® IP RAN Optimization is an efficient, flexible radio access network (RAN) transport optimization solution that can help Global System for Mobile Communications (GSM) and Universal Mobile Telecommunications Service (UMTS) operators address these challenges. The solution includes three applications that help mobile operators:

- Reduce RAN transport operating expenses (OpEx) for GSM and UMTS networks by optimizing and aggregating multiple link Use the optimized transport network for future growth to support enhanced 2G (General Packet Radio Service [GPRS], Enhanced Data for Global Evolution [EDGE]) and 3G (UMTS, High-Speed Downlink Packet Access [HSDPA]) voice and data broadband wireless services without adding expensive T1/E1 lines
- Expand networks and deliver innovative, IP-based services such as camera broadcast and surveillance, Wi-Fi hotspots, and IP telephony access at existing GSM and UMTS cell sites to create new revenue streams
- Offload bandwidth-demanding traffic over an alternative backhaul such as Metro Ethernet, cable, WiMAX, and xDSL to further reduce OpEx, provide higher bandwidth, and increase network flexibility

GSM traffic is optimized by up to 50 percent by removing idle channels and repeating patterns on the time-division multiplexing (TDM) link, so operators can transport the same level of GSM traffic with half the number of T1/E1 links*. UMTS traffic is compressed by up to 30 percent by removing idle cells and unused padding, and multiplexing small payloads into single cells* The result is a transparent, radio-vendor-agnostic IP RAN transport and optimization solution that does not affect voice quality and does not require changes to the control and software of either the base transceiver station/base station controller (BTS/BSC) or the Node B/radio network controller (RNC).

*   Traffic reduction estimates are based on laboratory conditions and standards. Actual results will depend on configuration and environmental conditions.

The Cisco ONS 15454 SONET/SDH MSPP is a highly scalable and flexible carrier-class platform. When configured with a RAN-SM, the platform provides aggregation and optimization services for RAN backhaul traffic at the RAN's aggregation sites. The Cisco ONS platform enables the mobile network operator to aggregate hundreds of T1s/E1s on a single highly reliable platform built with compliance to industry standards such as Network Equipment Building System (NEBS) Level 3. The Cisco ONS SONET/SDH 15454 MSPP supports a wide range of TDM and IP features, eliminating the need for dedicated TDM cross connect and ATM platforms at the BSC/RNC site.

SOLUTION OVERVIEW

Figure 1. Cisco IP RAN Optimization Solution Overview
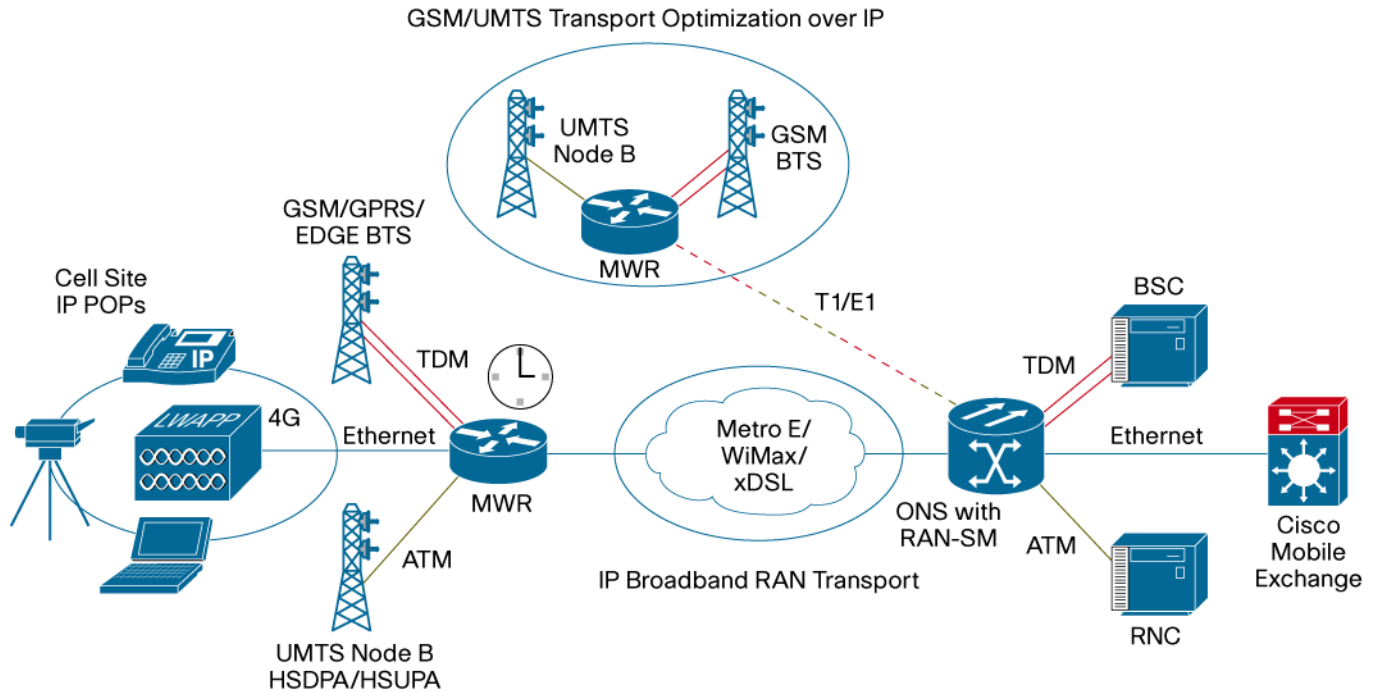
The Cisco IP RAN Optimization Solution consists of the cell-site Cisco MWR 1941-DC-A Mobile Wireless Edge Router, the Cisco RAN-SM for aggregation at a central site, and the Cisco Mobile Wireless Transport Manager (MWTM) management application:

- The Cisco MWR 1941-DC-A is an environmentally strengthened router that aggregates and optimizes GSM and UMTS traffic.
- The Cisco ONS RAN-SM is deployed in an ONS 15454 SONET/SDH MSPP at the aggregation node for central sites to join remote cell-site nodes and perform deoptimization and distribution of optimized RAN backhaul traffic.
- The Cisco MWTM is a feature-rich application that provides tools for troubleshooting, capacity planning, and inventory reporting. These tools help to monitor and maintain network efficiency for an optimized mobile backhaul infrastructure.

Note: The Cisco ONS RAN-SM is expected to be generally available in Q4CY2006. Until the module is available, the Cisco MWR 1941-DC-A is recommended for deployment at the cell site and at the aggregation node.

SOFTWARE FEATURES

The Cisco ONS RAN-SM supports the Cisco IOS® Software operating system with RAN-specific feature sets to enable optimization of mixed-generation cell-site backhaul links. The RAN-SM supports 2G, 2.5G, and 3G voice and data traffic, optimizing the traffic to only transmit essential data and reducing the total traffic load on the backhaul network. The solution is completely RAN-vendor-agnostic, making it compatible even with proprietary Abis interface specifications. Cisco IP RAN Optimization provides a transparent end-to-end solution that does not affect voice quality, and does not require any change in the control and software update operations of both BTS/BSC and Node B/RNC.

The GSM RAN optimization feature optimizes GSM Abis interface traffic between the BTS and BSC. The feature removes nonessential traffic such as idle and silence frames, which can result in optimization gains of up to 50 percent, depending on traffic profiles*. Optimized traffic frames are converted to IP packets and transmitted to the remote IP peer where any removed frames are reinserted and then forwarded to the base station system (BSS) node.

*   Traffic reduction estimates are based on laboratory conditions and standards. Actual results will depend on configuration and environmental conditions.

The UMTS RAN optimization feature optimizes the Iub interface between the Node B and RNC elements. It supports ATM-based traffic and performs cell optimization and conversion to IP packets. The conversion to IP allows the software to route each permanent virtual circuit (PVC) through a defined IP path, allowing different PVCs to use the most efficient backhaul technologies available at the cell site.

For both GSM and UMTS environments, the solution provides the following benefits:

- Standards-based, future-ready backhaul technology: The solution supports Multilink Point to Point Protocol (MLPPP) for backhaul links as defined in the Third-Generation Partnership Project (3GPP) R5 specifications.
- All IP Integrated Solution: the solution offers IP based RAN backhaul with IP based service offerings for the cell and aggregation sites. The IP based backhaul supports multiplexing of UMTS, GSM and IP traffic over the same link or bundle of links. The IOS software running in the RAN-SM supports a range of IP based services such as IP Routing protocols (OSPF, RIP etc), DHCP, NAT and NTP
- Redundancy support: The RAN-SM supports N:1 redundancy
- Support for wide range of GSM and UMTS voice and data codecs including FR, EFR, HR, AMR, GPRS, EDGE and HSDPA
- Support for HSDPA offload and alternative backhaul network technologies for voice and data transport to the cell site.

Quality of service (QoS) enables reliable transport of GSM and UMTS traffic together with IP traffic. GSM and UMTS traffic are given high priority, which helps ensure timely deliver to the far end. IP traffic is fragmented and interleaved within RAN traffic, and is transported across the backhaul link as best-effort traffic with low priority. Among IP-based services, multiple queues can be defined in order to assign different priorities to different types of IP traffic. This allows creation of a prioritization hierarchy, where the highest level is always reserved to the RAN traffic, and where IP traffic is handled by lower-priority queuing mechanisms. In addition, the solution includes:

- **Congestion management—**The software includes a comprehensive backhaul congestion management system that allows it to monitor the data rates and then alarm and control the traffic rates of specific traffic types, based on user-defined congestion conditions.
- **Detailed management support—**The RAN-SM is managed via the Cisco Mobile Wireless Transport Manager element management system, which allows simplified and scalable network element management and advanced statistics reporting on the overall health of the RAN backhaul.

HARDWARE OVERVIEW

The Cisco ONS RAN-SM is a multiprocessor application card designed for the Cisco ONS 15454 platform. When combined with the E1-42/T1-56 and OC-3 line cards in the Cisco ONS 15454 SONETchassis, the RAN-SM provides a high-rack-density aggregation function for the Cisco IP RAN Optimization solution. When the RAN-SM is used in combination with a Cisco MWR-1941-DC-A, it provides transparent RAN aggregation and optimization services, enhancing the Cisco IP RAN Optimization solution portfolio.

The Cisco ONS 15454 enables service providers to build robust, scalable, multiservice transport networks to support their metropolitan-area (metro) or regional, public, and private communications needs. The Cisco ONS 15454 is the first in its class to consolidate SONET/SDH, dense wavelength

division multiplexing (DWDM) transmission, Layer 2 and Layer 3 packet-processing functions, and storage area network (SAN) transport with the intelligence of IP-based RAN optimization in a single, cost-effective platform. Designed for metro and regional networks, the Cisco ONS 15454 offers a wide mixture of data, voice, and video service interfaces, efficient bandwidth aggregation, and scalable transport bandwidth from 155 Mbps (OC-3/STM-1) to 10 Gbps (OC-192/STM-64) and integrated DWDM transmission for continued network scalability. The Cisco ONS 15454 provides operational simplicity by using the Cisco Transport Controller—an integrated, network-based GUI—to simplify the setup, provisioning, and maintenance of the transport network. A powerful element management system, the Cisco Mobile Wireless Transport Manager assists with monitoring the RAN network's health and allows integration to operations support systems and network management systems. With such advanced capabilities and management and planning tools, the Cisco ONS 15454 can provide a solid foundation for growing communications infrastructures.

The Cisco ONS 15454 platform comprises a 17-slot chassis with 5 common-function slots and 12 universal slots. The common slots house redundant Timing, Control and Communication cards (TCC), redundant cross-connect cards, and an alarm card. The universal slots house high-speed and low-speed application cards. Application cards range from low-speed E1/T1 processing cards to high-speed OC-192/STM-64 processing cards and the Cisco ONS RAN-SM.

In the Cisco ONS 15454 chassis, the RAN-SM transmits and receives E1/T1 data streams (for Abis application) and OC-3/STM-1 data streams (for UMTS applications) through the cross-connect cards. For E1 connections (Abis and/or backhaul), as many as 126 E1 interfaces from multiple E1-42 cards may be "groomed" by the cross-connect card to form two STM-1 data streams, which are directed to and terminated on the RAN-SM. For OC-3 interfaces (POS and/or ATM), as many as eight OC-3 interfaces from multiple OC-3 cards may be groomed by the cross-connect card to form two STM-4 data streams, which are directed to and terminated by the RAN-SM as well.

Each RAN-SM contains four Fast Ethernet/Gigabit Ethernet ports and includes advanced Layer 2 processors performing ATM segmentation and reassembly functions and TDM sampling to ensure high performance and limited latency. Layer 3 functions are performed by multiple onboard high-speed RISC CPUs. All cards, including the RAN-SM, support a redundant Active/Standby configuration, providing a platform with service-provider-level availability.

The RAN-SM supports the following physical interface connectivity:

- **E1/T1**—Supported through Cisco ONS add/drop multiplexer (ADM) functions
- **E3/T3**—Supported through Cisco ONS add/drop multiplexer (ADM) functions
- **STM-1/OC-3**—Supported through Cisco ONS ADM functions
- **Fast Ethernet/Gigabit Ethernet**—Supported on the Cisco ONS RAN-SM

SYSTEM SPECIFICATIONS

Table 1 lists specifications for the Cisco ONS 15454 MSPP.

Table 1. Cisco ONS 15454 MSPP Specifications

Parameter	Specification
Physical Dimensions	ANSI shelf assembly:
	• 19- or 23-in. EIA rack-mounting
	• H x W x D: 8.5 x 17.6 x 12.0 in. (470 x 445 x 305 mm)
	ETSI shelf assembly:
	• ETSI and 19-in. rack-mounting
	• H x W x D: 24.3 x 17.5 x 11.0 in. (616.5 x 445 x 280 mm)

Parameter	Specification
Power	Dual-power input terminal block, voltage monitored with threshold crossing alarms (TCAs)
	Voltage:
	• –48 VDC nominal
	• –40.5 to –56.7 operating range
	Current:
	• 5A minimum
	• 22A maximum @ nominal voltage*
Weight	ANSI:
	• 55 to 80 lb (25 to 36.3 kg)
	ETSI:
	• 80 to 110 lb (36.2 to 49.8 kg)

*   Maximum current draw is based upon shipping system configuration, not equipment design limits.

Table 2 describes the ANSI chassis for the Cisco ONS 15454 MSPP.

Table 2.   ANSI Chassis Mechanical Systems

Card Type	Description
Chassis	• 17 front-access common and interface card slots, integrated fan-tray slot
Fan-Tray Assembly	• 6-fan module assembly, integrated liquid crystal display
Electrical Interface Options	• Rear access, A-side + B-side
BNC	• DS-3 and EC-1; 96 Tx/Rx (maximum)
Subminiature B (SMB)	• DS-3 and EC-1, DS-1 with balun; 168 Tx/Rx (maximum)
AMP CHAMP	• DS-1; 168 Tx/Rx (maximum)
Wire Wrap	• DS-1; 168 Tx/Rx (maximum), SMB EIA required
UBIC	• DS-1; 224 Tx/Rx (maximum)
	• DS-3 and EC-1; 192 Tx/Rx (maximum)

Table 3 describes the ETSI chassis for the Cisco ONS 15454 MSPP.

Table 3. ETSI Chassis Mechanical Systems

Card Type	Description
Chassis	• 17 front-access common and interface card slots; 12 front-access electrical, power, and timing slots; integrated fan-tray slot
Fan-Tray Assembly	• 6 fans, integrated liquid crystal display
Electrical Interface Options	• Front access
T54 (1.0/2.3)	• E1; 336 Tx/Rx (maximum) • E3, DS-3; 120 Tx/Rx (maximum) • E4: 32 Tx/Rx (maximum)
Low-Force Helix (LFH) Connector	• E1: 336 Tx/Rx (maximum)

CISCO ONS 15454 REGULATORY STANDARDS

Industry Requirements
- Network Equipment Building Standards (NEBS) Level 3 (GR-1089-CORE and GR-63-CORE)
- SONET (GR-253-CORE, GR-1400-CORE, and GR-1230-CORE)
- SDH (G.703, G.704, G.707, G.781, G.782, G.783, G.813, G.841 G.957, and G.691)
- IEEE (802.1)

Safety
- CAN/CSA-C22.2 No. 950-95 Third Edition, December 1, 2002
- GR-1089-CORE Level 3
- UL 60950 Third Edition
- EN 60950 (to A4)
- IEC 60950/EN 60950, Third Edition
- IEC 60950-1/EN 60950-1, 1st Ed. (CB Report/Certificate with all country deviations)
- UL and cUL/CSA 60950-1 1st Ed.

EMC Emissions (Radiated, Conducted)
- ICES-003
- GR-1089-CORE Level 3
- 47CFR15
- CISPR22
- EN 300 386-TC
- EN55022

EMC Immunity
- GR-1089-CORE Level 3
- CISPR24
- EN300-386-TC
- EN55024

Environnemental

- GR-63-CORE
- ETS 300 019-2-1 (Storage, class 1.1)
- ETS 300 019-2-2 (transportation, class 2.3)
- ETS 300 019-2-3 (operational, class 3.1E) with extended air temperature (Class 3.4)

ORDERING INFORMATION

The Cisco ONS RAN Service Module part number is ONS-RAN-SVC. Table 4 lists the Cisco ONS 15454 part numbers.

Table 4.   Recommended Cisco ONS 15454 Part Numbers

E1-Only Configuration	T1-Only Configuration
Cisco ONS 15454E: E1 Ports	**Cisco ONS 15454: T1 Ports**
15454E-SA-ETSI	15454-SA-HD
15454E-ETSI-FTF	15454-FTF2
15454E-FTA-48V	15454-FTA3-T
15454E-XC-VXL2.5G	15454-XC-10G
15454E-TCC2	15454-TCC2
15454E-AIC-I	15454E-AIC-I
15454E-E1-42	15454-DS1E1-56
15454E-CTP-MIC48V	ONS-RAN-SVC
15454E-AP-MIC48V	
15454E-E1-120PROA	
15454E-E1-120PROB	
ONS-RAN-SVC	
Mixed E1 and STM-1 Configuration	**Mixed T1 and OC-3 Configuration**
Cisco ONS 15454E: E1 Ports and STM-1 Ports	**Cisco ONS 15454: T1 Ports and OC-3 Ports**
15454E-SA-ETSI	15454-SA-HD
15454E-ETSI-FTF	15454-FTF2
15454E-FTA-48V	15454-FTA3-T
15454E-XC-VXL2.5G	15454-XC-10G
15454E-TCC2	15454-TCC2
15454E-AIC-I	15454E-AIC-I
15454E-E1-42	15454-OC3I8-1310
15454E-S1.1-8	15454-DS1E1-56
15454E-CTP-MIC48V	ONS-RAN-SVC
15454E-AP-MIC48V	
15454E-E1-120PROA	
15454E-E1-120PROB	
ONS-RAN-SVC	

STM-1-Only Configuration	OC-3-Only Configuration
Cisco ONS 15454E: STM-1 Ports	Cisco ONS 15454: OC-3 Ports
15454E-SA-ETSI=	15454-SA-HD
15454E-ETSI-FTF=	15454-FTF2
15454E-FTA-48V=	15454-FTA3-T
15454E-XC-VXL2.5G	15454-XC-10G
15454E-TCC2	15454-TCC2
15454E-AIC-I=	15454E-AIC-I
15454E-S1.1-8	15454-OC3I8-1310
15454E-CTP-MIC48V=	ONS-RAN-SVC
15454E-AP-MIC48V=	
ONS-RAN-SVC	

For Cisco ONS 15454 part descriptions, please visit: http://www/en/US/products/hw/optical/ps2006/index.html

SERVICE AND SUPPORT

The award-winning service and support offerings from Cisco Systems® provide presales network-audit planning, design consulting, network implementation, operational support, and network optimization. By including service and support when purchasing the IP RAN Optimization solution, customers can confidently deploy a network architecture using Cisco expertise, experience, and resources.

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