DATA SHEET

5144

Ciena's 5144 is a cost-effective router designed to address the requirements for higher capacity and end-to-end disaggregated IP services at the network access, supporting the 4G network evolution, 5G deployments, and next-generation business services. 5144 addresses customers' key needs, providing greater Segment Routing label stack depth and 1/10GbE ports density in a compact 1RU form factor. The 5144 features a high-capacity 120 Gb/s switching fabric supporting 8 x 1GbE/10GbE SFP+ ports, and 20 x 100MbE/1GbE SFP ports addressing the continued demand for bandwidth and scale at the cell sites and access network.

The carrier-grade router is based on Ciena's Service-Aware Operating System (SAOS), which is used in all of Ciena's Routing and Switching platforms to deliver a consistent set of benefits, including interoperability between platforms, improved efficiency of operations, and service consistency among applications. The ease with which these products can be automated and managed has been demonstrated in more than a million deployments worldwide.

The SAOS not only delivers the benefits of a field-proven and time-tested set of features, but also allows owners to offer services that stay ahead of bandwidth demands cost-effectively, protecting the operator's investment. The feature capabilities address the widely varying demands of end-customers and a multitude of deployment scenarios, all of which lead to reduced cost of ownership and increased end-user satisfaction.

Ciena's SAOS is based in a disaggregated and containerized architecture, so the 5144 has the capacity to deliver IP services in a way that is open, automated, and lean.

Features and Benefits

- Offers 120 Gb/s of non-blocking switching capacity in a compact device
- Features low footprint 1RU packaging with:
  – 8 x 1GbE/10GbE SFP+ ports
  – 20 x 100MbE/1GbE SFP ports
- Carrier Ethernet, IP routing and SR-MPLS
- Hardware-assisted routing and switching OAM scaled to deliver services with guaranteed SLA differentiation
- Secure Zero-Touch Provisioning (SZTP) for rapid, secure, and error-free turn-up of services
- Built-in RFC 2544 and ITU-T Y.1564 SAT
- Ciena's MCP multi-layer support for end-to-end network management control and planning
- NETCONF/YANG mechanisms to enable a fully open SDN environment
- Redundant AC or DC power

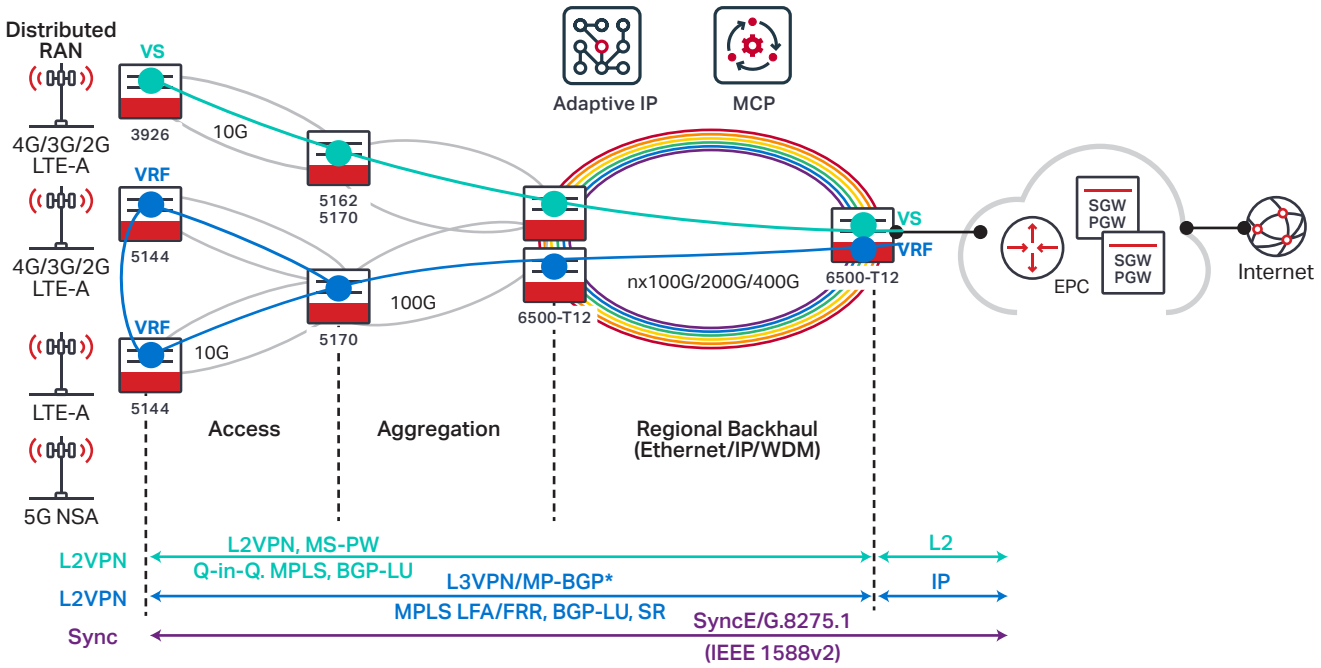

Figure 1. Example of 5144 cell site router implementation

Dense, compact form-factor platform

With the increasing need for capacity and scalability at the network edge, the efficient use of real estate assets is a growing concern for network operators, who either host their own network equipment or lease power, space, and connectivity from wholesale providers. As services multiply, operators must focus on efficient ways to support 10GbE services or aggregate multiples of 1GbE to 10GbE at the network edge. The 5144's sleek, shallow depth and front access facilitate cabinet and controlled environmental vault deployment. Extended temperature range support allows for installations in uncontrolled environments for outdoor aggregation of 1GbE, enabling high density at the outdoor edge for both 4G and 5G connectivity.

Space is increasingly limited and expensive, and network operators face substantial capital expenditures to activate new locations or must retire active equipment to free space for new service delivery. Addressing bandwidth demand growth by deploying more and larger equipment is simply not a sustainable business model—economically or environmentally. Ciena's 5144 cost-effectively offers dense 1/10GbE service delivery in a 1RU, 252mm-deep, fixed form-factor with dual power supplies and a variety of pluggable optics to minimize network downtime.

Fine-grained SLA monitoring and enforcement

The 5144 includes performance benchmark testing based on ITU-T Y.1564 and RFC 2544, enabling end-to-end 1/10GbE line-rate traffic measurements across virtual circuits. This approach improves end-customer satisfaction by enabling operations personnel to proactively respond to network events via increased performance visibility for differentiated Service Level Agreement (SLA) reporting.

Advanced multi-layer protocol support

The 5144 supports a flexible selection of service offerings, including L2 and L3 services, over a carrier-class, connection-oriented infrastructure using MPLS and Segment Routing.

The platform supports a rich suite of L2/L3 features with Ethernet, MPLS, MPLS LDP, Seamless MPLS, OAM, Sync, ACL, QoS, TACACS+ RADIUS, streaming telemetry, NETCONG/YANG, IGP (IS-IS, OSFP), BGP/MP-BGP, LAG , FRR, SR, TI-LFA, and Segment Routing functionality.

The 5144 operates as a full-featured IP router supporting NETCONF/YANG to easily integrate into an open SDN environment with full visibility via streaming telemetry and automated provisioning using open APIs.

Synchronization and timing

The cost-effectiveness and versatility of networking is driving the convergence of services and placing new network synchronization requirements onto the access/aggregation network. Provision of accurate frequency, phase, or time references from the network is also beginning to emerge as a service in its own right. The 5144 provides the ability to address these requirements with support for synchronous Ethernet, IEEE 1588v2, and Stratum 3E holdover.

Differentiation through accelerated service velocity

Service velocity has become a critical competitive advantage for network operators, mobile, and wholesalers. In many cases, service velocity is the determining factor in winning new service opportunities. The 5144 implements Ciena's unique Secure Zero-Touch Provisioning (SZTP) capabilities, allowing operators to deploy new services rapidly and securely in a fully automated manner. Reducing or eliminating costly and time-consuming manual intervention via SZTP eliminates provisioning errors. Most importantly, SZTP improves service deployment velocity and offers significant competitive advantage.

Rich routing and switching Operations, Administration, and Maintenance (OAM) suite of capabilities

As network operators and their customers increasingly rely on new networks, providers must maintain guaranteed service levels. Networks must support a broad array of routing and switching OAM capabilities to ensure operators can proactively and reactively maintain and report on the ongoing health of their networks and delivered services. The 5144 also supports a comprehensive set of hardware-assisted OAM capabilities, and is architected to provide SLA metrics and OAM at a high scale. This enables operators to take full advantage of the port density and 120 Gb/s fabric for delivering the maximum number of services at the lowest cost. Additionally, the 5144 has an embedded line-rate Service Activation Test (SAT) engine (RFC 2544, ITU-T Y.1564) with traffic generation guarantees for strict, market-differentiating SLAs, without relying on costly external test equipment and the highly trained personnel that requires.

Simplified multi-layer management and control

Ciena's Manage, Control and Plan (MCP) domain controller software offers a unique and comprehensive solution for the administration of mission-critical networks that span access, metro, and core domains, and provides unprecedented multi-layer visibility from the photonic to the data layers. With this innovative management approach, MCP supports a programmable and automatable solution that provides a fully open approach to installing, manipulating, and monitoring service behaviors in an SDN environment.

Technical Information

Interfaces

Ethernet Ports:
20 x 1GbE/100MbE SFP ports

8 x 10GbE/1GbE SFP+ ports

Other:
1 x USB-C

1 x USB-C Console

1 x RJ45 1pps and Time-of-Day (ToD)

1 x SMB frequency in/out or 1 pps in/out

1 x SMB GNSS antenna

1 x RJ45 Management (MGMT)

Ethernet

IEEE 802.1ad Provider Bridging (Q-in-Q) VLAN full S-VLAN range

IEEE 802.1D MAC Bridges

IEEE 802.1p Class of Service (CoS) prioritization

IEEE 802.1Q VLANs

IEEE 802.3 Ethernet

IEEE 802.3ab 1000Base-T via copper SFP

IEEE 802.3ad Link Aggregation Control Protocol (LACP)

Layer 2 Control Frame Tunneling

Link Aggregation (LAG): Active/Active; Active/ Standby

Jumbo frames to 9216 bytes

VLAN tunneling (Q-in-Q) for Transparent LAN Services (TLS)

Carrier Ethernet OAM

EVC Ping (IPv4)

IEEE 802.1ab Link Layer Discovery Protocol (LLDP)

IEEE 802.1ag Connectivity Fault Management (CFM)

IEEE 802.3ah EFM Link-fault OAM

ITU-T Y.1731 Performance Monitoring

Synchronization

External Timing Interfaces:
ITU-T G.703 Frequency in or out (1.544MHz, 2.048MHz, and 10MHz)

ITU-T G.703 1pps and ToD in or out

Mini-SMB in or out 1pps

Integrated GNSS receiver

ITU-T G.8262/G.8264 EED option1 and option2

G.8273.2 Timing characteristics of telecom boundary clocks and telecom slave clocks, Class C

Stratum 3E oscillator

Networking Protocols

ISO10598 IS-IS intra-domain routing protocol

OSFP Segment Routing extension

OSFP TI-LFA Topology Independent Fast Reroute using Segment Routing

RFC1195 Use of OSI Is-Is for Routing in TCP/IP and Dual Environments

RFC1997 BGP Community Attribute

RFC2328 OSPF Version 2

BGP Prefix Independent Convergence

EVPN FXC draft-ietf-bess-evpn-vpws-fxc-03.txt

RFC2698 A Two Rate Three Color Marker

RFC2865 Remote Authentication Dial in User Service (RADIUS)

RFC3031 Multiprotocol Label Switching (MPLS) Architecture

RFC3032 MPLS label stack encoding

RFC3107 Support BGP carry Label for MPLS

RFC4271 A Border Gateway Protocol 4 (BGP-4)

RFC4360 BGP Extended Communities Attribute

RFC4364 BGP/MPLS IP Virtual Private Networks (VPNs)

RFC4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP)

RFC4632 Classless Inter-domain Routing (CIDR): The Internet Address Assignment and Aggregation Plan

RFC4760 Multiprotocol Extensions for BGP-4

RFC4762 Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling (HVPLS)

RFC5004 Avoid BGP Best Path Transitions from One External to Another

RFC5036 LDP Specification

RFC5037 Experience with the LDP protocol

RFC5301 Dynamic Hostname Exchange Mechanism for IS-IS

RFC5302 Domain-Wide Prefix Distribution with Two-Level IS-IS

RFC5303 Three-Way Handshake for IS-IS Point-to-Point Adjacencies

RFC5309 Point-to-Point Operation over LAN in Link State Routing Protocols

RFC5396 Textual Representation of Autonomous System (AS) Numbers

RFC5398 Autonomous System (AS) Number Reservation for Documentation Use

RFC5492 Capabilities Advertise with BGP-4

RFC5561 LDP Capabilities

RFC5668 4-Octet AS Specific BGP Extended Community

RFC6241 Network Configuration Protocol (NETCONF)

RFC6310 Pseudowire (PW) Operations, Administration, and Maintenance (OAM) Message Mapping

RFC6793 BGP Support for Four-Octet Autonomous System (AS) Number Space

RFC7432 EVPN VPWS/VPLS

RFC7737 Label Switched Route (LSP) Ping and Traceroute Reply Mode Simplification SR-MPLS TI-LFA Topology Independent Fast

Networking Protocols continued

Reroute using Segment Routing draft-ietfrtgwg-segment-routing-ti-lfa-03

RFC7911 Advertisement of Multiple Paths in BGP

RFC8214 Virtual Private Wire Service Support in Ethernet VPN

Network Management

Alarm Management and Monitoring Configuration

Event and Alarm Notification/Generation Comprehensive Management

Via CLI Management

Via Netconf/YANG Models

gRPC-based Streaming telemetry

IPv4 & IPv6 Management Support

IPv4 Management ACL (in-band)

IPv6 Management ACL (in-band)

RADIUS, AAA

RFC 2131 DHCP Client

RFC 3046 DHCP Relay

RFC 5905 NTP Client

Secure File Transfer Protocol (SFTP)

Secure Shell (SSHv2)

Secure Zero-Touch Provisioning (SZTP)

Software upgrade via FTP, SFTP

TACACS + AAA

Web GUI

Physical Characteristics

Dimensions:
17.5" (W) x 9.9" (D) x 1.75" (H)

444mm (W) x 252mm (D) x 44mm (H)

Weight:
AC variant: 11 lbs.; 5.0 kg

DC variant: 11 lbs.; 5.0 kg

Power Requirements:
DC input: -48 Vdc (nominal)

AC input: 100Vac, 240 Vac (nominal)

Typical Power Consumption 120W (Estimated)

Max Power Consumption 190W (Estimate)

Technical Information continued

Standards Compliance

Emissions:
CISPR 22 Class A

CISPR 32 Class A

EN 300 386

EN 55032

FCC Part 15 Class A GR-1089 Issue 6

Industry Canada ICES-003 Class A
VCCI Class A

VCCI Class A

Environmental:
RoHS2 Directive (2011/65/EU)

WEEE 2002/96/EC

Operating Temperature:
-40°F to +149ºF (-40°C to +65°C)

Storage Temperature:
-40°F to +158°F (-40°C to +70°C)

Humidity:
Non-condensing 5% to 90%

Immunity (EMC):
GR-1089 Issue 6

CISPR 24

Power:
ETSI EN 300 132-2

ETSI EN 300 132-3

Safety:
ANSI/UL 60950-1 2nd edition 2007

CAN/CSA C22.2 No. 60950-1-07

EN 60950-1

IEC 60825-1 2nd edition (2007)

IEC 60825-2 3rd edition (2004)

Service Security

Broadcast Containment Egress Port Restriction

Hardware-based DOS Attack Prevention Layer 2, 3, 4 Protocol Filtering

User Access Rights Local user authorization

Visit the Ciena Community
Answer your questions

Ordering information (SAOS 10.x) – Router Configuration	
Part Number	Description
170-5144-900	5144, (20)100M/1G SFP, (8)10/1G SFP+, EXT. TEMP, DUAL DC POWER
170-5144-901	5144, (20)100M/1G SFP, (8)10/1G SFP+, EXT. TEMP, DUAL AC POWER
Required OS Base System Perpetual Software Licenses	
S75-LIC-5144EO-P	SAOS ETHERNET & OAM, AND 10G ON PORTS 1-24, SOFTWARE LICENSE FOR 5144, PERPETUAL
Optional OS Applications	
S75-LIC-5144MPLS-P	SAOS ROUTING AND MPLS APPLICATION SOFTWARE LICENSE FOR 5144, PERPETUAL
S75-LIC-5144SYNC-P	SAOS SYNCHRONIZATION SOFTWARE LICENSE FOR 5144, PERPETUAL
S75-5144SEC-P	SAOS SECURITY SOFTWARE LICENSE FOR 5144, PERPETUAL
S75-LIC514410G-P	SAOS10G UPGRADE ON PORTS 25-28 LICENSE FOR 5144, PERPETUAL