Cisco ASR 5500 Multimedia Core Platform

As a mobile operator, the mobile broadband network that you built has forever changed the way that your customers work, live, play, and learn, and has become part of the very fabric of their everyday lives. However, mobile operators today face a significant challenge. Data traffic continues to grow exponentially, and regular network modifications are required to keep customers happy. New devices and applications are also drastically changing the way the network behaves. Competition in the mobile market is fierce, as the typical subscriber has multiple options for mobile service. At the same time, revenues are increasingly under pressure. It is an age-old dilemma - how does one reduce cost and increase revenue?

To overcome these challenges, operators must build their core networks with three essential attributes: flexibility, intelligence, and scale. A flexible network is one that can adapt to frequently changing business models, with the ability to make in-network design modifications without huge capital expenditures. An intelligent network is one that recognizes the myriad of different user behavior patterns, and has the tools in place to allow operators to monetize these patterns quickly and transparently. Finally, a scalable network is one that can address the demands of today's mobile network requirements as well as those that will evolve in the future. Data traffic is not just increasing; it is becoming more complex, requiring a scalable and flexible solution across all performance parameters - throughput, transactions, bearers, and sessions.

With all these factors, mobile operators need a mobile packet core solution that they can count on - one that provides efficient evolution to fourth-generation (4G) technology and small cells. Operators must plan for the 'new normal' of the mobile internet - elastic, flexible, virtual. This means being able to harness the right resources (intelligent performance) when you need them - instantaneously. This new normal starts with the intelligent performance of the Cisco® ASR 5500 Multimedia Core Platform (Figure 1). Cisco ASR 5500 sets a new standard for intelligent performance that redefines the economics of the packet core. It is the first mobile platform designed for terabit performance that scales to tens of millions of sessions, and supports the transaction rates required to address the signaling surge.

Figure 1. Cisco ASR 5500 Multimedia Core Platform

Cisco ASR 5500 Architecture

As the newest member to the industry-leading Cisco ASR 5000 series, the Cisco ASR 5500 carries forward the existing ASR 5000 benefits of flexibility and intelligence, while providing substantial increases in scale and performance. The Cisco ASR 5500 is a high-capacity platform, specifically designed to satisfy the high performance, subscriber counts, and transaction rates of third-generation (3G) and 4G Long-Term Evolution (LTE) services plus the emergence of small cells.

The Cisco ASR 5500 supports an elastic architecture for mobile functions, in which these functions are based on software, not coupled to hardware. The ASR 5500 harvests system resources and applies them across the entire platform to optimize performance and maximize capital efficiency. This approach allows operators to deploy more efficient mobile networks that can support a greater number of concurrent calls, optimize resource usage, and deliver enhanced services, while also providing easy scalability.

The Cisco ASR 5500 uses the same software and operating system, StarOS, as the Cisco ASR 5000, supporting a consistent set of services across platforms, which results in a significantly lower impact on operations teams. With the Cisco ASR 5000 series, platform decisions are based on performance, not function or software - operators now have multiple options based on size, scope, and scale.

Flexibility

A flexible network is one that can adapt to frequently changing business models, with the ability to make in-network design modifications without huge capital expenditures. With its powerful elastic architecture, the Cisco ASR 5500 platform is access-independent and can be transparently deployed in various access networks.

As the Cisco ASR 5500 is based on the same software system as the Cisco ASR 5000, it carries forward the same benefits of flexibility in terms of the various mobile functions that the product can satisfy. A true next-generation core puts the power of network architecture and design in the hands of operators, instead of forcing operators to work within the bounds of competitive platform limitations. The Cisco ASR 5500 has the flexibility to meet the individual deployment needs of operators, and allows functions to be shifted to maintain the correct balance as the needs of the network changes. Below are some of the mobile functions possible on the Cisco ASR 5500:

- LTE/EPC - Serving Gateway (SGW)
- LTE/EPC - PDN Gateway (PGW)
- UMTS/HSPA - Gateway GPRS Support Node (GGSN)
- CDMA/HRPD/eHRPD - Home Agent (HA)

Because the network functions required for any of these access technologies can be combined in a single Cisco ASR 5500 platform, operators can realize significant operational savings and a simplified network. The flexibility of the platform helps operators to prepare for next-generation technologies, such as LTE. As a result, their 3G investment is secure when they migrate to 4G.

Intelligence

Cisco ASR 5500 contains real-time integrated, session-state intelligence, including deep packet inspection (DPI) from Layer 1 to Layer 7 for all traffic. Taking full advantage of this intelligence allows operators to dramatically increase service velocity (by making the intelligence flexibly and virtually available to services), and improve the customer experience, while optimizing the cost of the network. This sets the stage for continued profitability well into the future. The platform interacts with and recognizes all the major elements that make up the multimedia connection-devices, subscribers, networks, applications, transport mechanisms, location, session-state, and policies-and assists in service-creation velocity by:

- Providing a greater degree of information granularity and flexibility for billing, network planning, and usage trend analysis
- Sharing information with external application servers that perform value-added processing
- Exploiting user-specific attributes to launch unique applications on a per-subscriber basis
- Extending mobility management information to non-mobility-aware applications
- Enabling policy, charging, and quality-of-service (QoS) features

The integrated intelligence of the Cisco ASR 5500 provides exceptional inline service capabilities, which allow operators to achieve a higher degree of optimization, lower operating expenditures, increased service velocity, and higher levels of service assurance, in comparison with solutions that require external platforms through a variety of advanced applications. Cisco ASR 5500 inline service capabilities include:

- Enhanced content charging
- Stateful firewall protection
- Application detection and optimization
- Content filtering
- Network-based traffic optimization
- Video pacing
- Header enrichment

Inline services at the network edge increase network scalability through simple distributed service deployment, reduce latency by simplifying the network, protect subscriber sessions with powerful security capabilities, and reduce the total cost of ownership (TCO) through integration. The Cisco ASR 5500 employs the latest encryption and security software and firmware for the vital protection of subscriber sessions. Various authentication protocols are used to secure network access to valid subscribers, while IP Security (IPSec) encryption and termination provide a secure and private session.

Performance and Scale

The evolution to flat IP network architectures and the large growth in mobile Internet traffic has a tremendous impact on signaling, throughput, latency, and mobility. Traditional platforms maximize either signaling or bearer performance at the cost of the other type of performance.

The Cisco ASR 5500 is purpose-built to address the needs of the mobile multimedia market and provide high performance to address growing network signaling and user plane demands. The market-proven Cisco ASR 5000 Series reduces the cost per byte for bearer traffic while reducing the cost per attached user for signaling traffic. Going forward, mobile networks will require a solution that scales across all performance parameters - throughput, transactions, bearers, and sessions. Cisco has answered that call with the new ASR 5500, the industry's most powerful mobile platform to date:

- First mobile platform designed for true terabit performance (can support the equivalent of all peak simultaneous mobile traffic in North America for 2010)
- Extends Cisco's lead in transaction processing and number of sessions, continuing our leadership in control plane processing (10-fold architectural increase)
- Holistic performance capabilities beyond throughput
- Superior performance across the metrics that matter most: sessions, bearers, subscribers, and transactions

Resiliency and Redundancy

The Cisco ASR 5500 architecture employs full hardware and software redundancy, as well as high-availability software techniques. The platform can anticipate faults and provide quick, non-session-disrupting recovery to maximize network uptime, maintain user sessions, retain billing information, and help ensure a high-quality experience.

The self-healing attributes of the Cisco ASR 5500 include:

- Session recovery
- Fault containment
- State replication
- Task checkpoint and migration
- 1:N or 1:1 redundancy for all hardware elements
- Dynamic hardware removal and additions (hot-swappability)
- Inter-chassis session recovery or geographic redundancy between multiple platforms

Enhanced Operating System and Management

Cisco ASR 5500 uses the StarOS operating system, a customized, real-time version of Linux that provides a comprehensive and highly flexible operating environment. The operating system is designed to distribute and manage sessions across the entire platform through:

- Application hosting capabilities
- Modular distributed processing
- High-availability features
- Robust development environment
- Context support, allowing multiple logical systems to exist in one platform

The platform can be managed locally and remotely through the following:

- Command-line interface (CLI) supporting telnet, Secure Shell (SSH), and local login through a console port
- Web management using an advanced application based on Common Object Request Broker Architecture (CORBA)
- Simple Network Management Protocol (SNMP) support for event notification

Specifications

Table 1 lists specifications for the Cisco ASR 5500.

Table 1. Cisco ASR 5500 Product Specifications

Description	Specification
Logical Interfaces	• GSMA • GSM UMTS • SIGTRAN • IMS Ma, Mw, Mg, Mj, Mr, ISC, Cx, Sh • IETF SIP • H.248 • ECMP, IEEE 802.1q VLANs, IEEE 802.3ad link aggregation • MPLS LSPs, GRE interface tunnels • L2TP, IPSEC
Physical Dimensions	• Height: 93.3 cm (36.75 in,) • Width: 43.8 cm (17.25 in.) • Depth: 69.9 cm (27.5 in.) • Mounting weight (chassis): 51.25 kg (113 lb) • Total weight (fully loaded): 204.1 kg (450 lb)
Power	• Base 20-slot chassis: 256W • Fabric and storage card (up to 6 per chassis): 100W • System status card (up to 2 per chassis): 10W • Management I/O card (up to 6 per chassis): 900W • Data processing card (up to 8 per chassis): 1000W • Front fan tray (2 per chassis): 60W • Back fan tray (2 per chassis): 840W • Total power (fully loaded): 12,800W • 8 power feeds, capable of carrying 80A each • Operating voltage: -40.5 to -72V
Environmental	• Normal operating temperature: 0℃ to 40℃ (32℉ to 104℉) • Storage temperature: -40℃ to +70℃ (-40℉ to 158℉) • Normal operating humidity: 20% to 80% noncondensing • Storage humidity: 10% to 95% noncondensing • Normal operating altitude: 60m (197 ft) below to 4,000m (13,123 ft) above sea level (at 30℃) • Non-operating altitude: 60m (197 ft) below to 15,000m (49,212 ft) above sea level
GSM/UMTS (CS Domain)	• 3GPP TS 24.008, 48.006, 48.008, 25.413, 29.232, Q.1950, 23.003, 29.002, 23.039, 23.040, 23.401, 23.402, 24.011, 24.080, 24.081, 24.083, 24.084, 24.091, 24.173, 23.009, 49.008
IETF	• RFC 1035, 2046, 2387, 2617, 2782, 2915,2976, 2833, 3261(SIP), 3263(SIP), 3262, 3264, 3265(SIP), 3310, 3311, 3323, 3325, 3327(SIP), 3428, 3455, 3551, 3588, 3608(SIP), 3680, 3761, 3842, 3966, 4483, 4566
CDMA	• CDMA A.S0013-C v2.0, A.S0014-C v2.0, C.S0005-D v2.0

For More Information

For more information, please visit http://www.cisco.com/go/mobile.

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