



Cisco **BTS** 10200 Softswitch

Telecommunications innovators recognize the opportunities made possible by migrating from time-division multiplexing (TDM)-switched voice telephony to packet-based networks. The Cisco® BTS 10200 Softswitch meets the high-quality and reliable packet voice requirements of a softswitch network, providing call-control intelligence for establishing, maintaining, routing, and terminating voice calls. It serves as an interface to enhanced, converged voice-and-data services and application platforms such as voice mail and unified messaging.

Taking advantage of the power and flexibility of packet-based networks while operating with traditional circuit-switched infrastructures, the Cisco BTS 10200 Softswitch empowers service providers and carriers to gracefully transition to packet-based technology. Implementing the Cisco BTS 10200 Softswitch helps to ensure rapid service deployment, carrier-grade reliability, service flexibility, scalability to millions of subscribers, and cost savings through operational efficiencies and investment optimization.

The Cisco BTS 10200 Softswitch incorporates a comprehensive feature set, including call control for local voice services that previously required implementation of large, complex telephone switches. Compared to traditional switching systems, the Cisco BTS 10200 Softswitch gives providers and their subscribers significant savings in equipment and transmission costs, space, and the required time to deploy services. The Cisco BTS 10200 is a class-independent softswitch, supporting applications for local and transit services and Signaling System 7 Primary Rate Interface/TDM (SS7 PRI/TDM) offload.

Solutions Enabled by the Cisco BTS 10200 Softswitch

The Cisco BTS 10200 Softswitch is the foundation for several voice solutions from Cisco Systems®, including Cisco Broadband Local Integrated Services Solutions (BLISS) for Cable, Metro Ethernet, and T1/E1, and the Cisco Voice Infrastructure and Applications (VIA) solution for wireline and wireless networks. For more information about Cisco voice solutions, visit:

www.cisco.com/go/sp-voice

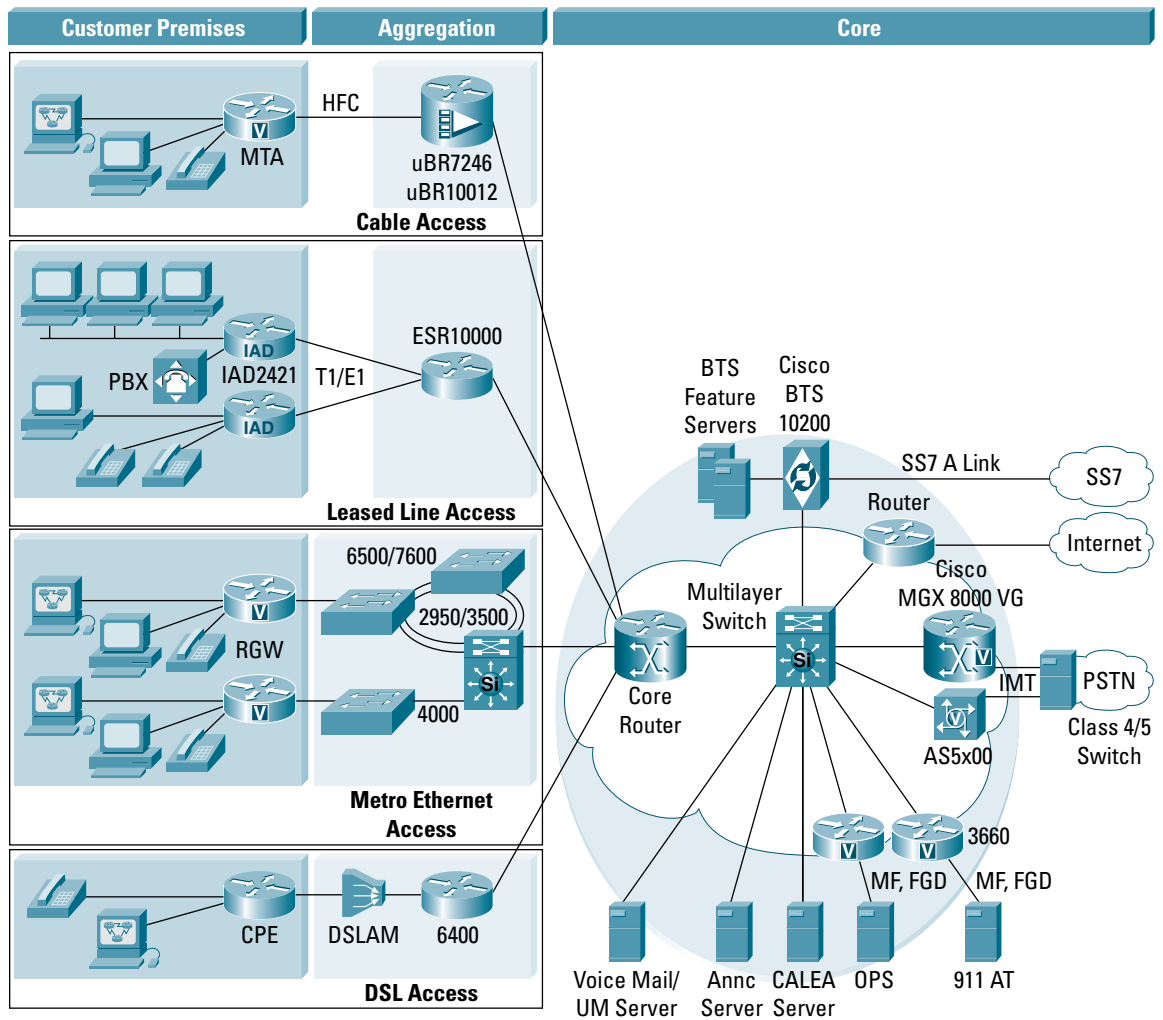
Cisco BLISS

Cisco BLISS allows service providers to deliver multiple services over a common broadband access network, expanding their market potential. Through the BLISS portfolio, Cisco enables service providers to deliver packet-based local telephony services to their end customers over the same access network that simultaneously delivers data and video services. Cisco BLISS is supported over several broadband access networks, including cable, metro Ethernet, and T1/E1.



Cisco BLISS solutions combine proven network components, structured network architectures, and tight integration and testing of network elements to deliver innovative and profitable multiservice networks (Figure 1).

Figure 1
Cisco BLISS Network Configuration



Cisco BLISS benefits:

- One network, one transport protocol, multiple services (voice, video, and data)
- Increased revenue, profits, and customer loyalty by delivering additional services over an existing infrastructure
- Fast deployment of advanced services such as voice messaging and video services
- Proven, industry-leading network components for reliable, scalable, carrier-class packet networks
- Structured architecture for flexible, high-performance network services
- Pure packet-based network infrastructure, reducing the operating costs required to run multiple networks



Cisco BLISS specializations include:

Cisco BLISS for Cable

Cisco BLISS for Cable delivers packet voice and data services designed to meet the CableLabs PacketCable requirements. The PacketCable initiative has defined specifications for solutions to deliver advanced, real-time multimedia services over a two-way cable network for North American multiservice operators (MSOs). PacketCable standards are also being adapted for Europe.

Cisco has supported and been involved with both CableLabs and the PacketCable initiative from the start of the PacketCable initiative. The Cisco BTS 10200 Softswitch obtained PacketCable 1.0 qualification in CableLabs Certification Wave 25, April 11, 2003. The BTS 10200 and the Cisco uBR10012 now join the Cisco uBR7246VXR, PacketCable 1.0 qualified in Cert Wave 24, as an elite group of products to have passed the rigorous tests.

Cisco BLISS for Cable reflects this ongoing commitment and provides a multiservice voice-over-cable solution, available today, that meets the needs of MSOs looking to increase their revenues by offering additional services.

Cisco BLISS for Metro Ethernet

Cisco BLISS for Metro Ethernet enables service providers to deliver data, voice, and video over simple and inexpensive Ethernet access networks. The solution delivers always-on 10/100-Mbps Ethernet connections to each user, supporting data (Internet, LAN interconnect, and virtual private networks [VPNs]), voice (basic and supplementary), and video (conferencing, on-demand, and broadcast) services. This solution is well-suited for serving residential and small- and medium-sized-business customers in a metropolitan area where fiber-optic networks are generally available.

Cisco BLISS for T1/E1

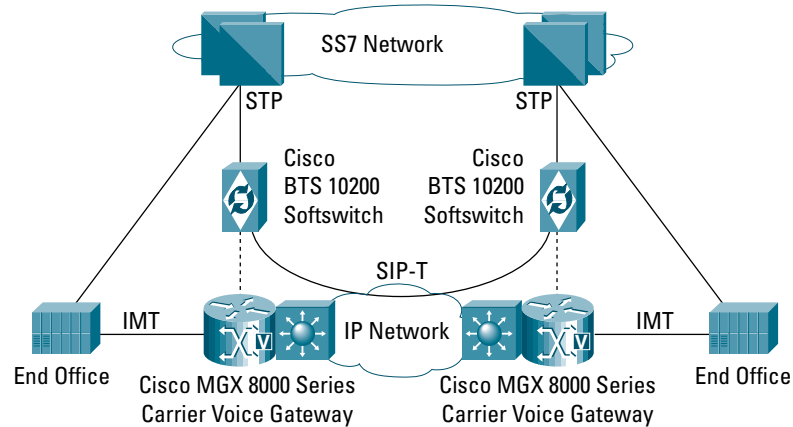
Cisco BLISS for T1/E1 delivers packet voice and data services over a traditional T1/E1 infrastructure. Using existing access lines, Cisco BLISS for T1/E1 allows service providers to offer a bundle of packet-based services, including local and long-distance voice services and high-speed data. By providing multiple services over a common infrastructure, a carrier can increase its revenue and profits, while offering small and medium-sized business customers a better telecommunications value. Cisco BLISS for T1/E1 has been successfully deployed in the North American market for more than two years and is supporting more than a million calls per day.

Cisco VIA Solution

The Cisco VIA solution supports wholesale origination, transit, and termination services by enabling voice-traffic routing over an IP network (Figure 2). Its architecture is built on open standards, enabling faster time to revenue for new services while helping to ensure interoperability with divergent networks. Based on high-density Cisco media gateways, routers, and LAN switches, and carrier-class Cisco BTS 10200 Softswitch platforms, the Cisco VIA solution separates call control, bearer control, and feature functions to provide a truly open-system, tandem-switch deployment. This infrastructure enables service providers to rapidly deploy new revenue-generating services over packet networks. The Cisco VIA solution also enables service providers to provide reliable, high-quality, toll and toll-free retail services to consumers and businesses and to partner with wholesale terminating carriers to transport voice traffic originating on their networks.

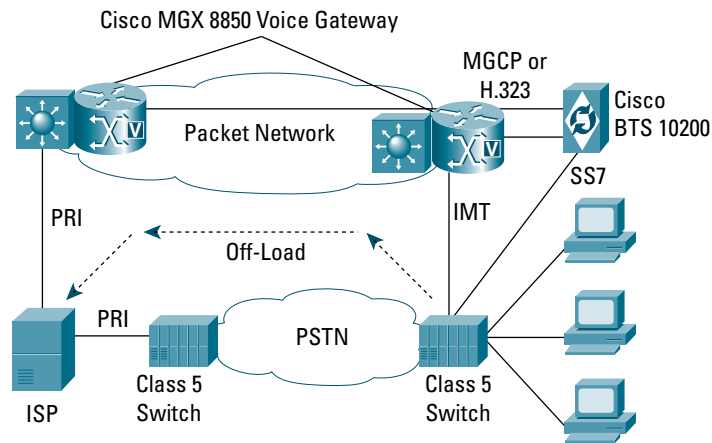


Figure 2
Cisco VIA Solution Network Configuration



The Cisco BTS 10200 Softswitch and the Cisco MGX[®] 8850 Voice Gateway can be integrated into a circuit-switched voice network to provide SS7 PRI grooming and PRI offload (Figure 3). Carriers can groom traffic at the point of interconnect and switch data traffic via PRI to Internet service provider (ISP) network access servers (NASs) while sending voice traffic over SS7 Inter-Machine Trunks (IMTs) to existing circuit switches or other networks. By offloading data traffic, switch congestion is eliminated and the carrier's existing voice switch is used for its original purpose—handling voice traffic efficiently.

Figure 3
Cisco SS7 PRI Grooming and TDM Offload



The Cisco BTS 10200 Softswitch offers tremendous flexibility to service providers who want to deploy local and transit services and facilitates cost reduction through grooming. It serves as the ideal platform for:

- Cable operators
- Startup local services carriers
- Resellers moving to facilities-based services
- Facilities-based competitive local exchange carriers (CLECs)
- Fixed-wireless carriers



The standards-based Cisco BTS 10200 Softswitch enables new, innovative, easily differentiated services for a fortified broadband services offering. Services can be quickly deployed, and time-consuming and costly upgrades to each transport element are not required—the Cisco BTS 10200 Softswitch extracts and centralizes the call-control and service applications from the transport network. In addition to telecommunications services, service providers can offer a wider range of other business and residential services, including multiservice VPNs, Web hosting, and Internet access. These content-rich services not only improve overall customer satisfaction and enhance customer loyalty, but also result in increased online time for subscribers.

Bundling gives the service provider more account control and allows subscribers to benefit from a single, comprehensive invoice for all their telecommunications needs. A bundled data and voice service offering delivered over a single, integrated multiservice packet network translates into lowered total cost of network ownership, increased revenue per customer, access to new markets, reduced customer turnover, and deepened relationships with existing subscribers.

Cisco BTS 10200 Softswitch Architecture and Components

The Cisco BTS 10200 Softswitch enables IP and Asynchronous Transfer Mode (ATM) connections to the PSTN using SS7, H.323, Media Gateway Control Protocol (MGCP), and Session Initiation Protocol (SIP) standards. The system integrates call-control and services software on an open UNIX platform. All Cisco BTS 10200 Softswitch equipment and paths are fully redundant with an architecture that eliminates single-point failures and is designed for 99.999-percent reliability. The Cisco BTS 10200 Softswitch delivers the call-throughput capabilities required for even very large subscriber bases (Figure 4).

Figure 4

The Cisco BTS 10200 Softswitch

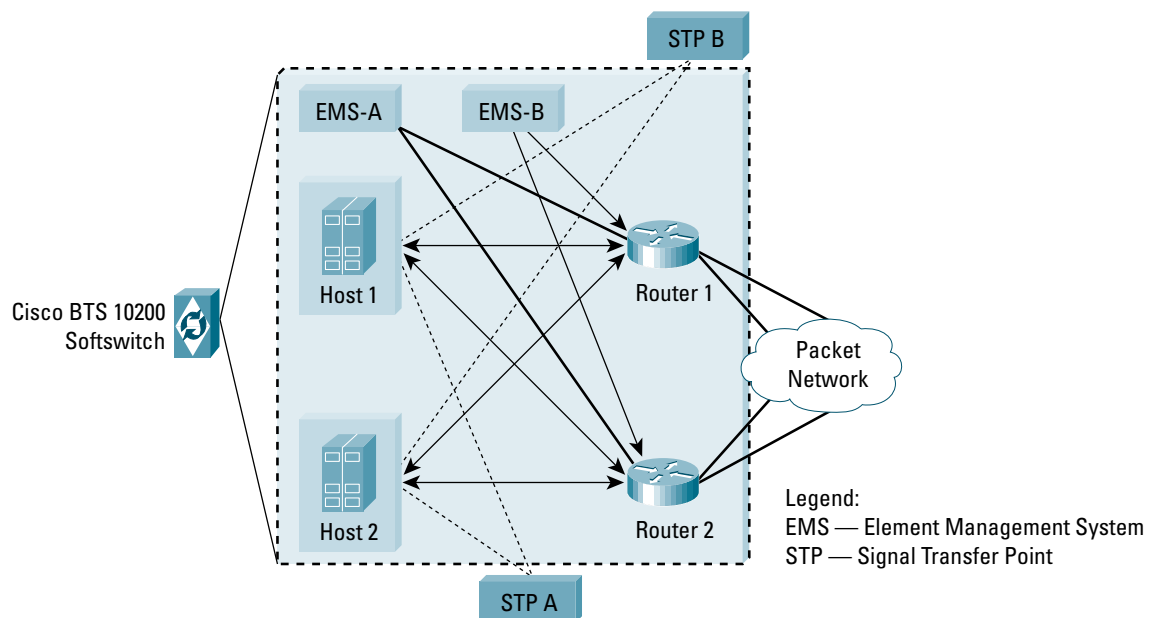




Three elements comprise the Cisco BTS 10200 Softswitch (Figure 5):

- The call agent component serves as a call management system and media gateway controller. Each Cisco BTS 10200 Softswitch system incorporates multiple call agents to handle capacity and redundancy requirements.
- The element management system (EMS) serves as a mediation device between a network management system (NMS) and one or more call agents. The EMS facilitates the provisioning, administration, reporting, and billing features of the Cisco BTS 10200 Softswitch. Cisco Extensible Provisioning and Operations Manager (EPOM) is a Web-based graphical user interface (GUI) in the Cisco BTS 10200 EMS that saves operator time and simplifies Cisco BTS 10200 provisioning through the use of wizards. Cisco EPOM facilitates other repetitive tasks (adding subscribers, for example) by eliminating redundant steps and duplication of effort. Cisco EPOM optimizes user productivity by providing online access to EMS documentation, allowing traversal of different configuration items, views into the status of the provisioned media gateways, and user group administration security.
- The feature server provides an open protocol and flexible framework for the introduction of new and innovative features into the network, allowing service providers to take advantage of multivendor products. It provides various basic telephone service and Centrex, tandem, and Advanced Intelligent Network (AIN) services to the calls controlled by the call agents. It also processes features such as call forwarding and call waiting.

Figure 5
Cisco BTS Softswitch Elements



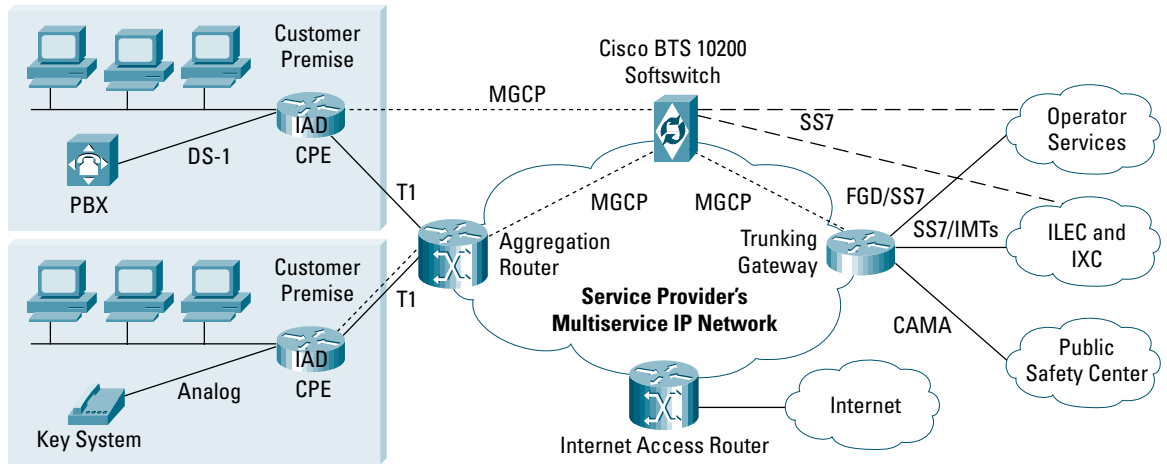
Built-In Redundancy Ensures Efficient Call Management and High Availability

The Cisco BTS 10200 Softswitch supports real-time maintenance and provisioning plus automated interfaces for service integration. It requires no product customization to interoperate with public and multivendor infrastructures (Figure 6). By taking advantage of open protocols in both directions—up to the feature server and down to the transport server—the Cisco BTS 10200 Softswitch is well suited to multivendor infrastructures.



Figure 6

The Cisco BTS 10200 Softswitch Empowers Service Providers to Deliver Advanced Services and Applications to Subscribers



The Cisco BTS 10200 Softswitch provides detailed reporting information for billing and quality-of-service (QoS) requirements. Thorough call-detail records are generated for every call. Each call-detail record includes QoS metrics such as jitter and average packet latency. Traffic data is collected at regular intervals during the day and the collected data is kept for two days for ensured protection. Choose from either the Cisco EPOM GUI or command line interface (CLI)—both provide intuitive system setup and administrative capabilities.

Converged Voice and Data Network Advantages

The Cisco BTS 10200 Softswitch allows carriers to introduce converged communications services while cutting costs, through the implementation of a single platform that efficiently supports many nonsegregated types of traffic. Studies have shown that IP and ATM technologies can cut costs in half, compared to the costs associated with implementing and maintaining conventional circuit switches.¹ The Cisco BTS 10200 Softswitch combines an innovative architecture, an open platform and interfaces, and the ability to operate in a multivendor network. Some important platform features and benefits are outlined in Tables 1, 2, and 3.

Table 1 Cisco BTS 10200 Softswitch Features and Benefits

Feature	Benefit
Comprehensive industry-standard protocol support	<ul style="list-style-type: none"> Seamless integration with the Public Switched Telephone Network (PSTN) and multivendor voice and data networks; enables implementation of best-of-breed network components
Carrier-grade reliability with Network Equipment Building Systems (NEBS) compliance and redundant platform components	<ul style="list-style-type: none"> Telephony-grade quality with the flexibility of packet-switched technology

1. Source: RHK Telecommunications Industry Analysis: New Voice Infrastructure: Global Market and Forecast Analysis, January 2001.



Table 1 Cisco BTS 10200 Softswitch Features and Benefits

Feature	Benefit
Interoperable with numerous commercial feature servers	<ul style="list-style-type: none"> • Fast deployment of advanced services
Feature server architecture, which provides an open protocol	<ul style="list-style-type: none"> • Rapid development and deployment of lucrative customized services
Streamlined maintenance, provisioning, and service activation	<ul style="list-style-type: none"> • Reduced operational costs
Integrated access device support	<ul style="list-style-type: none"> • Reduced subscriber costs with single-line delivery and billing for voice and data services; provides flexible bandwidth allocation to meet varying or peak traffic demands
GUI and CLI	<ul style="list-style-type: none"> • Cisco EPOM GUI wizards ease operations by allowing the user to step through provisioning and consolidate or eliminate redundant transactions
Comprehensive reporting features, including billing records	<ul style="list-style-type: none"> • Sophisticated billing capabilities and integration with standard billing systems
Network scalability through deployment of multiple, centrally managed call agents	<ul style="list-style-type: none"> • Economical startup deployments and flexible expansions to support growing subscriber bases and services; reduced infrastructure costs

Table 2 Cisco Voice Advantages

Cisco Packet Voice Network Advantage	Evidence
High-quality, reliable packet voice	<ul style="list-style-type: none"> • Leader in voice quality as evidenced by industry reports • Existing large, successful networks based on Cisco solutions, including examples of networks that transport more than 1 billion packet-based telephony minutes yearly • Most experience in building and managing packet networks • Support for several QoS techniques
Open standards and worldwide interoperability and compatibility	<ul style="list-style-type: none"> • Largest, most geographically diverse customer base • Support for multiple protocols and transmission technologies (IP, ATM, and Frame Relay; H.323, MGCP, and SIP) • Serves as a “reference standard” for many interoperability tests such as the Mier report • PSTN interoperability (SS7 connectivity and local signaling variants)



Table 2 Cisco Voice Advantages

Cisco Packet Voice Network Advantage	Evidence
Industry leader with the broadest product offering	<ul style="list-style-type: none"> • Voice products in every segment • Market-share leader in most categories • Best-of-breed products • Strategic commitment to all markets • End-to-end solutions • Corporate size and financial stability
Easy and rapid service creation and deployment	<ul style="list-style-type: none"> • Numerous best-in-class applications through extensive partner programs • Open platform • Tools for third-party development • More overall IP service offerings
More tools for service provider success	<ul style="list-style-type: none"> • Cisco Service Carrier Community • Cisco Powered Network program • Cisco Service Acceleration Joint Marketing program • Cisco Customer Advocacy services and support

Table 3 Technical Features and Specifications

Technical Features	Specifications
Call model	<ul style="list-style-type: none"> • ITU-CS2 model
Numbering plan	<ul style="list-style-type: none"> • One 10-digit North American Numbering Plan (NANP), support service codes (N11), and private numbering plan
Provisioning	<ul style="list-style-type: none"> • Cisco EPOM Web-based GUI, File Transport Protocol (FTP), Telnet, CLI
Management	<ul style="list-style-type: none"> • Simple Network Management Protocol Version 1 (SNMPv1) agent, Common Object Request Broker Architecture (CORBA), CLI
Software and Billing interface	<ul style="list-style-type: none"> • Call-detail record, third-party billing



The Cisco BTS 10200 Softswitch allows service providers to offer basic voice services, business group services, and long-distance services. Table 4 lists some of the services implemented in the Cisco BTS 10200 Softswitch.

Table 4 Services

Category	Services
Basic Services	<ul style="list-style-type: none">• Operator services: 0+, 1+, 011+, 00 support, and CAC+0+• 911 support: Emergency ringback, end-to-end called-party hold, switch hook status display, and forced disconnect• Carrier presubscription inter-local access and transport area (inter-LATA), intra-LATA, and international• Directory assistance: 411, 1 + listing service, and 0 + listing service• Call waiting and cancel call waiting• Calling-number delivery and blocking• Intercept and call failure treatments• Call forwarding: Unconditional, busy, and no answer• Toll-free services: 800, 888, 877, and so on• Call-detail blocks to provide traditional and packet-level billing information• Local number portability (LNP)• Caller ID and cancel caller ID• Support for 211, 311, 511, 611, and 711• Anonymous call rejection• Support for split Numbering Plan Area (NPA)• Voice-mail support• Remote activation of call-forwarding subscriber-controlled services (screening list-based features) such as:<ul style="list-style-type: none">– Selective call forwarding (SCF)– Selective call acceptance (SCA)– Selective call rejection (SCR)– Distinctive ringing call waiting (DRCW)• User-controlled activation or deactivation for anonymous call rejection• Customer-originated call trace• Multiple domain names per subscriber (teen service)• Hotline and warmline service• Automatic callback—within Cisco BTS 10200 Softswitch• Bulk provisioning
Business Group Services	<ul style="list-style-type: none">• Three-way calling• Extension dialing• Authorization codes and account codes• Call hold and call transfer• Business group direct inward dialing (DID)/direct outward dialing (DOD)• Class-of-service restrictions• Multiline hunting• Business group, local, long-distance, and international calling• Distinctive ringing for DID and extension calling• Call waiting with caller name and ID for private numbers• Private calling name on internal transfer or forwarding



Table 4 Services

Category	Services
Long-Distance Services	<ul style="list-style-type: none">• Automatic number identification (ANI) delivery and blocking• Account and authorization codes• Dialed-number ID service (DNIS) outpulsing and overflow treatment• Incoming 800• Least-cost routing• Time-of-day routing• 500 special access codes<ul style="list-style-type: none">– ANI screening– Class of service (black/white list)– Account codes– Authorization codes– 8xx services and LNP support– Inbound 8xx database (8xx Serial Control Protocol [SCP])– Voice VPN (flexible 4-, 7-, and 10-digit dialing) support– Dial-around support– Dialed number, carrier identification code (CIC), and ingress Trunk Group -based routing– SS7 Feature Group D services• Multiple dial plans; international call routing<ul style="list-style-type: none">– Policy-based routing and screening capabilities– Nature of address routing (coin and payphone, for example)– Weighted alternate routes– Test lines• Wholesale support

To support today's multivendor networks, several signaling protocols are implemented in the Cisco BTS 10200 Softswitch (Table 5).



Table 5 Protocol Support

Protocol	Description	Reference Number	Organization
MTP	SS7, Message Transfer Part (MTP)	T1.111/GR-246	ANSI, Telcordia
SCCP	SS7, Signaling Connection Control Part (SCCP) functional description	T1.111/GR-246	ANSI, Telcordia
TCAP	SS7, Transaction Capability Application Part (TCAP)	T1.111/GR-246	ANSI, Telcordia
AIN 0.1	AIN 0.1 SCP application protocol interface generic requirements	TR-NWT-001285	Telcordia
AIN 0.1 SSP	AIN 0.1 Switching Systems Protocol (SSP) generic requirements	TR-NWT-001284	Telcordia
AIN toll-free	Switching and signaling generic requirements for toll-free service using AIN	GR-2892	Telcordia
IN/1 toll free	Service switching points; toll-free service	GR-533-CORE	Telcordia
TCAP CNAM	CLASS Custom local area signaling services (CLASS) Feature: Calling Name Delivery (CNAM) generic requirements	GR-1188-CORE	Telcordia
LNP	Local number portability (LNP)	T1S1.6 TR2	ATIS
ISUP	SS7, Integrated Services Digital Network (ISDN) User Part (ISUP)	T1.113/GR-246	ANSI, Telcordia
ISUP	LSSGRLATA Switching Systems Generic Requirements: Switching system generic requirements for call control using ISUP	GR-317	Telcordia
ISUP Feature Group D (FGD) (IXC Interconnection)	LSSGR: Switching system generic requirements for interexchange carrier (IXC) interconnection using the integrated services digital user part (ISDNUP)	GR-394	Telcordia
ISDN L3 NI2	ISDN PRI call-control switching and signaling generic requirements for Class II equipment	TR-NWT-001268, SR-4994	Telcordia
ISUP-PRI Interworking	Switching system requirements supporting ISDN access using ISUP	TR-NWT-000444, T1.609	Telcordia, ANSI



Table 5 Protocol Support

Protocol	Description	Reference Number	Organization
MGCP	Media Gateway Control Protocol (MGCP) versions 1.0 and 0.1	RFC2705 (Draft-huitema-MGCP-v0r1.txt)	IETF
NCS	Network-Based Call Signaling Protocol (NCS)	Pkt-sp-ec-mgcp-i02-991201	CableLabs
SIP	Session Initiation Protocol (SIP)	RFC2543	IETF
SIP-T	SIP for Telephony (SIP-T): Context and architectures	Draft-ietf-sip-isup-00.txt (G. Camarillo, A Roach, "Best Current Practice for ISUP to SIP Mapping")	IETF
Analog DID	Analog direct inward dialing (DID)	TIA/EIA-464-B, TR-TSY-000524	ANSI, Telcordia
Bell-I, Bell-II	Operator services signaling; also applicable for 911 services	TR-NPL-000258, OSSGR FR-271	Telcordia
CAS	Channel associated signaling (CAS) (multifrequency/ dual-tone multifrequency [DTMF] trunk)	TR-NPL-258, GR-506	Telcordia
CORBA	Common Object Request Broker Architecture (CORBA)	Version 2.3	OMG
SNMP	Simple Network Management Protocol (SNMP)	Version 2c	IETF
H.323	Packet-based and multimedia communications system	H.323 versions 2, 3, and 4	ITU

Cisco BTS 10200 Hardware Specifications

Table 6 Specifications of Cisco BTS 10200 Softswitch

Configuration	Number of Boxes	CPU per Box	Memory Per Box	Disks Per Box
CCPU	2	AXmp with 4 440 MHz Processors	4 GB	2 ± 36 GB
	2	AXi with 1 440 MHz Processor	2 GB	2 ± 36 GB
Netra 20	4	2 ± UltraSPARC III@ 900 MHz	4 GB	2 ± 73 GB
Sun Netra t120	4	1 ± UltraSPARC III@ 900 MHz	2 GB	2 ± 36 GB
Sun Fire v120	4	1 ± UltraSPARC III@ 900 MHz	2 GB	2 ± 36 GB

Regulations (Meets or Exceeds Requirements)

Safety

UL 1950 Third Edition, CCA C22.2 No. 950, TUV EN 60950, CB scheme with nordic deviations EMKO-TSE (74-SEC) 203, ZH1/618, and GR-1089-CORE

RFI/EMI

FCC Class A, EN 55022 Class A, EN 61000-3-2, and GR-1089-CORE

Immunity

EN 50082-1 and GR-1089-CORE

Certification

NEBS, Bellcore SR-3850 First edition, Level 3 (mission critical), and UL



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