



# SS7-BRICKS

BY NETBRICKS

## INTRODUCTION

Signaling System #7 (SS#7 also referred as CCS7 – common channel signaling 7 or CS7 or SS7) is a set of standards that specify signaling control in PSTN (Public Switched Telephone System). SS#7 standards have been defined and released by ITU-T and have been adapted or extended by carrier, regional or national standardization bodies such as the American National Standards Institute (ANSI) and Telcordia Technologies (formerly Bellcore) in North America and the European Telecommunications Standards Institute (ETSI) standard in Europe.

SS#7 signaling is performed out of band i.e. through dedicated channel and includes network model, procedures and protocols to establish, route and control a call over digital signaling networks. SS#7 signaling is based on message transfer and is operated by a set of complex protocols organized in an OSI like layered model. SS#7 signaling is in operation in legacy TDM network as well as in mobile core networks and is still an essential part of currently used telecommunication technologies.

**SS7-Bricks** is designed for seamless integration with Netbricks **SIGTRAN-Bricks** software products suite that implement SCTP protocol and Sigtran User Adaptation layers to build signaling gateways or Application Servers (AS) and softswitch.

NETBRICKS **SS7-Bricks** is a portable software product written in ANSI C language and implementing the following SS7 protocols for narrow band and broadband networks:

- Message Transfer Part 1, 2 and 3,
- ISDN User Part (ISUP),
- Signalling Connection Control Part (SCCP),
- Transaction Capabilities Applications Part (TCAP).

Each protocol layer can be supplied as an independent module.

**SS7-Bricks** is based on NETBRICKS flexible and successful architecture. It can be operated on a very wide range of CPUs. Interfaces to most of commercial OS/RTOS are provided: Windows NT/2000/XP, Linux (RedHat...) Embedded Linux (MontaVista,...), OSE, Solaris (32/64bits), VxWorks, AMX, Nucleus, PSOS+, RTC, VRTX,...

NETBRICKS audit built-in logging mechanism is included providing a dynamic tool to trace internal operations of **SS7-Bricks** as well.

**SS7-Bricks** is addressed to the OEM market. Netbricks can develop any custom product based on this technology according to Customer's specifications.

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**SS7-Bricks** software products suite comprises the following protocol layers:

- **MTP1** Message Transfer Part 1 implements for a synchronous full duplex bit stream :
  - q Signaling Unit (SU) delimitation (HDLC framing),
  - q SU alignment,
  - q HDLC bit stuffing and unstuffing,
  - q CRC16 calculation and error detection,
  - q Error Rate Monitoring (Alignment and Normal),
  - q Octet counting mode,
  - q Automatic Fill in Signaling Unit (FISU) transmission,
  - q Automatic Link Status Signaling Unit (LSSU) transmission,
  - q Automatic filtering of repeated SU,
  - q Support of HSL (High Speed Link)
  - q Provisioning and re-provisioning,
  - q SL and Management APIs,
  - q Can be supplied under the form of
    - a driver for specific micro controller SS7 microcode (Freescale PowerQuicc I,II or III),
    - a pure software module operating all MTP1 functions,
  - q Standard compliance: ITU-TS Q.701, Q.702, Q.703.
  
- **MTP2** Signaling Link (SL) implements the following functions :
  - q Link Control State (LSC),
  - q Initial Alignment Control (IAC),
  - q Processor Outage Control (POC),
  - q Transmission Control (TXC),
  - q Reception Control (RXC),
  - q Congestion Control (CC),
  - q Support of HSL (High Speed Link)
  - q Interface with MTP1,
  - q Provisioning and Re-provisioning,
  - q L3 and Management APIs,
  - q Standards compliance:
    - ITU-TS Q.701, Q.702, Q.703, Q.752,
    - ANSI T.111.3 (North America),
    - JT Q. 703 (Japan),
    - ETSI EN 300 008 (Europe).
  
- **MTP2b** (Broadband) SSAL-NNI Signaling ATM Adaptation Layer for use of SS#7 upper protocols over ATM networks and performing:
  - q SCCF-NNI Service Specific Coordination Function,
  - q SSCOP Service Specific Connection Oriented Protocol,
  - q Interface with ATM AAL5 SAR layer,
  - q Provisioning and Re-provisioning,
  - q L3 and Management APIs,
  - q Standards compliance: ITU-TS Q.2110, Q.2140, Q.2144.

## SS7-BRICKS FEATURES and COMPLIANCE (continued)

- **MTP3** and **MTP3b** (Broadband) Signaling Network (SN) implements the following functions :
  - q Message Discrimination and Distribution,
  - q Message Routing,
  - q Load sharing,
  - q Message Sequencing,
  - q Signaling Link Activation, Changeover and Change back,
  - q Forced and controlled Rerouting,
  - q MTP Restart,
  - q Management Inhibiting,
  - q Congestion Control,
  - q Signaling Route Management,
  - q Signaling Link Tests,
  - q MTP User Flow Control,
  - q Provisioning and Re-provisioning,
  - q Layer 4 and Management APIs,
  - q Standards compliance:
    - ITU-TS Q.701, Q.704, Q.707, Q.782 (test specification),
    - ANSI T1.111.4 (North America),
    - JT Q.704, Q.707 (Japan),
    - GF001-9001 (China),
    - ETSI EN 300 0008 (Europe).
  
- **ISUP** (ISDN User Part) and **B-ISUP** (Broadband) performs the following functions :
  - q Message Distributing and Sending Control (MDSC) distributing received messages to Circuit Supervision Control or Call Processing control, and for sending messages to the remote end,
  - q Circuit Supervision Control (CSC) in charge of all circuit related operations: Blocking / Unblocking, Reset, Continuity Check...,
  - q Call Processing Control (CPC) responsible for call establishment and release,
  - q Provisioning and Re-provisioning,
  - q Application and Management APIs,
  - q Standards compliance:
    - ITU-T Q.761, Q.762, Q.763, Q.764,
    - France Telecom SSURF SPIROU specifications (1.0),
    - ETSI EN 300 356 version 3 (Europe),
    - Other country specific variants available on request.
  
- **SCCP** implements both connection oriented and connectionless modes and features:
  - q SCOC : SSCP Connection-oriented Control with support of both classes 2 and 3,
  - q SCRC : SSCP Routing procedures,
  - q SCLC : SSCP Connection-Less Control with support of both classes 0 and 1,
  - q SCMG : SSCP management,
  - q Provisioning and Re-provisioning,
  - q Application and Management APIs.
  - q Standards compliance:
    - ITU-TS Q.711, Q.712, Q.713, Q. 714
    - ANSI T1.111.4 (North America),

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## SS7-BRICKS FEATURES and COMPLIANCE (continued)

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- **TCAP** transaction capabilities application part protocol features:
  - q Component sub layer (CSL) including
    - component handling (CHA) comprising component coordinator (CCO) and invocation state machine (ISM),
    - dialogue handling (DHA) in charge of dialogue management,
  - q Transaction sub layer in charge of transaction management and comprising transaction coordinator (TCO) and transaction state machine (TSM). It also interface SCCP layer
  - q Application and Management interfaces,
  - q Standards compliance:
    - ITU-T Q.771, Q.772, Q.773 and Q.774
    - ANSI T1.112

## SS7-BRICKS SOFTWARE ARCHITECTURE

- q **COMMON PROCEDURES and SERVICES** : OS abstract layer and common system procedures
- q **SYSTEM MANAGEMENT ENTITY** : for configuration and event/error reporting
- q : socket adaptation layer to map standard UDP, TCP or SCTP socket interface
- q **ISUP, SCCP, MTPx, ATM** : Protocol layer entities

