Signaling System No. 7 (SS7) is a set of telephony signaling protocols which are used to set up most of the world’s public switched telephone network telephone calls. The main purpose is to set up and tear down telephone calls. Other uses include number translation, prepaid billing mechanisms, short message service (SMS), and a variety of other mass market services.

It is usually referenced as Signaling System No. 7 or Signaling System #7, or simply abbreviated to SS7. In North America it is often referred to as CCSS7, an acronym for Common Channel Signaling System 7. In some European countries, specifically the United Kingdom, it is sometimes called C7 (CCITT number 7) and is also known as number 7 and CCIS7 (Common Channel Interoffice Signaling 7).

An SS7 network is composed of service switching points (SSPs), signaling transfer points (STPs), and service control points (SCPs). The SSP gathers the analog signaling information from the local line in the network (end point) and converts the information into an SS7 message. These messages are transferred into the SS7 network to STPs that transfer the packet closer to its destination. When special processing of the message is required (such as rerouting a call to a call forwarding number), the STP routes the message to a SCP. The SCP is a database that can use the incoming message to determine other numbers and features that are associated with this particular call.

In the SS7 protocol, if an address, such as customer-dialed digits, does not contain explicit information to enable routing in a signaling network. It then will require the signaling connection control part (SCCP) translation function. This is a process in the SS7 system that uses a routing tables to convert an address (usually a telephone number) into the actual destination address (forwarding telephone number) or into the address of a service control point (database) that contains the customer data needed to process a call.

Intelligence in the network can be distributed to databases and information processing points
throughout the network and is available to all nodes as a result of the common channel signaling. Various companies have developed advanced services for communication carriers that are offered via the SS7 network. These services are referred to as advanced intelligent network (AIN) services.

This diagram shows the basic structure of the SS7 control signaling system. This diagram shows that a customer's telephone is connected to a local switch end office (EO). The service switching point (SSP) is part of the EO and it converts dialed digits and other signaling indicators (e.g. off-hook answer) to SS7 signaling messages. The SS7 network routes the control packet to its destination using its own signal transfer point (STP) data packet switches using separate interconnection lines. In some cases, when additional services are provided, service control point (SCP) databases are used to process requests for advanced telephone services. This diagram also shows that the connections used for signaling are different than the voice connections. This diagram shows that there are multiple redundant links between switches, switching points, and network databases to help ensure the reliability of the telephone network. The links between points in the SS7 system have different functions and message structures. Access links (A-links) are used for access control between EOs and SCPs. Bridge links (B-links), cross links (C-links), and diagonal links (D-links) interconnect STPs. Extended links (E-links) are optionally used to provide backup connections from an EO to the SS7 network. Fully associated links (F-links) share (associate with) the connection between EOs.
1. When a call is placed to an out-of-switch number, the originating SSP1 transmits an ISUP Initial Address Message (IAM) to reserve a trunk circuit from the originating SSP1 to the destination SSP2. The IAM includes the originating and destination points codes, the circuit identification code and the global title digits. The IAM is routed via the local STP1 of the originating SSP1 to the destination SSP2.

2. The destination SSP2 determines if it serves the called party. If so it generates a ringing tone at the called party's line and transmits an ISUP Address Complete Message (ACM) to the originating SSP1 via its local STP2. The ACM indicates that the remote end trunk circuit has been reserved. STP2 routes the ACM to SSP1 which generates a ringing tone to the calling party's line and connects it to the trunk circuit.

3. When the called party picks up the phone, SSP2 terminates the ringing tone and transmits an ISUP ANswer Message (ANM) to SSP1 via STP2. STP2 routes the ANM to SSP1 which verifies that the calling party line is connected to the reserved trunk and if so starts billing.

4. If the caller hangs up first SSP1 sends an ISUP RELease message (REL) to release the trunk circuit between the 2 switches. STP1 routes the REL to SSP2. Upon receiving the REL SSP2 disconnects the circuit from the called party's line and transmits an ISUP ReLease Complete message (RLC) to SSP1 to ack the release of the trunk circuit. When SSP1 receives the RLC it terminates billing.

5. If the called person hangs up first, SSP2 sends a REL to SSP1 indicating the release cause. When REL is received, SSP1 disconnects the circuit from the caller's line and transmits an ISUP ReLease Complete message (RLC) to SSP2. When SSP2 receives the RLC it terminates and stops billing.

ISUP Messages
IAM = Initial Address Message
ACM = Address Complete Message
ANM = Answer Message
REL = Release Message
RLC = Release Complete Message