National Information & Communications Technology Authority

SIGNALLING POINT CODE NUMBERING PLAN AND GUIDELINES

Papua New Guinea

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1. Introduction

Signalling provides the bond that holds together the transmission links and nodes in a network to provide a cohesive entity. By providing effective signalling system, a network is transformed into a tremendously powerful medium through which customers can communicate with each other using a range of telecommunications service. Old signalling systems that were simple mechanisms for transferring basic information are being replaced by efficient data-transfer highways.

Signalling is the interchange of information among various Nodes of the Network for the purpose of Establishing and controlling the connections, as well as providing network-wide Services and Management capabilities. Signalling can be visualized as the “Nervous System” of the Telecom Network. The worldwide signalling network has two functionally independent levels: the international level and the national level. This provides for a clear division of responsibility for signalling network management and allows identification plans of signalling points in the international network and the different national networks to be independent of one another. Within the International Signalling System No. 7 network, a signalling point is identified by an International Signalling Point Code (ISPC) while within the National signalling system No.7 network, a signalling point is identified by a National Signalling Point Code (NSPC). This document provides the plan and guidelines for the management of ISPC's and NSPC's for PNG. The Point Code Management function ensures that the current and future signalling address requirements for PNG’s telecommunications industry are properly met." It is to be noted some texts and definitions of this document are extracted from ITU-T recommendations in Q.70x series recommendations.

Annex (4) contains an overview for basic signalling functions, Common Channel Signalling (CCS7) protocol stacks and signalling network configuration.

2. Definitions

2.1 **Signalling Point (SP)**: A node in a signalling network that originates and receives signalling messages, or transfers signalling messages from one signalling link to another, or both.

2.2 **Signalling relation:** An association between two signalling points that allows inter-exchange of Signalling System No. 7 messages.

2.3 **Signalling Point Code (SPC):** A code used to identify a signalling point and processed within the Message Transfer Part (MTP) of each signalling point and within users of the MTP.

2.4 **International Signalling Point Code (ISPC)**: A signalling point code with a unique 14-bit format used at the international level for signalling message routing and identification of signalling points involved. The ISPC is used in signalling messages containing the Network Indicator NI=00.

2.5 **Member State**: Country" (or geographical area), and/or "Regulator" shall be considered as Member State as defined in ITU definition.

2.6 **Signalling links:** Signalling links are basic components in a signalling network connecting together signalling points. The signalling links encompass the level two functions, which provide for message error control (detection and subsequent correction). The signalling links, signalling transfer points, and signalling (originating or destination) points may combine in many different ways to form a signalling network.

2.7 **NICTA:** PNG Radiocommunications & Telecommunications Technical Authority.

2.8 **PNG**: The Independent State of Papua New Guinea

3. Abbreviations

CCS7	Common Channel Signalling System No 7
GMSC	Gateway Mobile Switching Centre
ISC	International Switching Centre
ISPC	International Signalling Point Code
ITU	International Telecommunication Union
ITU-T	Telecommunication Union – Telecommunication Standardization
LR	Location Register
LAEG	Lae Gateway Switch (International)
MTP	Message Transfer Part
NI	Network Indicator
NMC	Network Management Centre
NSPC	National Signalling Point Code
NID	Network Identification
OMC	Operation and Maintenance Centre
POMG	Port Moresby Gateway Switch (International)
SANC	Signalling Area/Network Code
SCCP	Signalling Connection Control Part
SCP	Service Control Point
SEP	Signalling End Point
SP	Signalling Point
SSP	Service Switching Point
STP	Signalling Transfer Point
TSB	Telecommunication Standardization Bureau

4. Objective

The overall objective of CCS7 signalling is to provide an internationally **standardized** general purpose Common Channel Signalling System.

- Optimized for operation in digital telecommunication networks in conjunction with stored program-controlled exchanges.
- Meet **present and future** requirements of information transfer for inter-processor transactions within telecommunications networks for call control, remote control, management and maintenance signalling.
- Provide a **reliable** means for transfer of information in correct sequence and with loss or duplication, which is an unimpeded transfer of information between customers, between nodes within networks and between customers and exchanges.

5. Scope

- The type of signalling system used in modern day environment,
- Description of CCS7 signalling system parameters,

- Signalling structure of CCS7 signalling system in the National and International networks,
- Defining of CCS7 signalling system parameters for National and International networks,
- Application criterias for National and International CCS7 signalling system,
- ISPC and NSPC assignment procedures,
- General descriptions of the Regulators and the Operators obligations.

6. Common Channel Signalling System (CCS7) Overview

6.1 History

Common Channel Signalling (CCS) is a technique that enables stored program control exchanges, network databases, and other nodes in a network to exchange messages related to call setup, call supervision, call release (connection control information), information needed for distributed application processing and network management information.

From the point of view of plain old telephone service (POTS), CCS is a technique that separates the physical channel used for signalling from that, which is used to carry the end user's telecommunication traffic. One signalling channel is able to carry the signalling control information of up to 3,000 trunks, depending on the implemented protocol; hence, the term "common channel signalling" is used.

Historically, signalling was done "in-band", i.e. the signalling information was exchanged over the same channel as the user's traffic. In-band signalling systems as e.g., Direct Current (DC) signalling, Single-Frequency (SF) signalling and Multi-Frequency (MF) signalling have been in use since the deployment of the first automatic telephony switching systems. The limitations of in-band signalling systems are mainly;

- their limited ability to signal during the active phase of a call,
- the bandwidth of about 30 bits per second and
- the inability to perform communication with databases.

ITU-T began work on Common Channel Signalling System No. 7 (CCS7) in the mid-1970. The first aim was to provide a signalling system for digital trunks. It then gradually evolved towards a family of layered protocols, enabling applications as e.g., ISDN, IN, GSM and many others.

The CCS7 network and protocol are used for;

- basic call setup, management, and tear down
- wireless services such as personal communications services (PCS), wireless roaming, and mobile subscriber authentication
- local number portability (LNP)
- free phone service.
- enhanced call features such as call forwarding, calling party name/number display, and three-way calling
- efficient and secure worldwide telecommunications

6.2 Signalling Links

CCS7 messages are exchanged between network elements over 64kbps or higher speed bidirectional channels called Signalling links. Signalling occurs out-of-band on dedicated channels rather than in-band on voice channels. Compared to in-band signalling, out-of-band signalling provides:

- faster call setup times (compared to in-band signalling using multi-frequency (MF) signalling tones)
- more efficient use of voice circuits
- support for Intelligent Network (IN) services which require signalling to network elements without voice trunks (e.g., database systems)
- improved control over fraudulent network usage

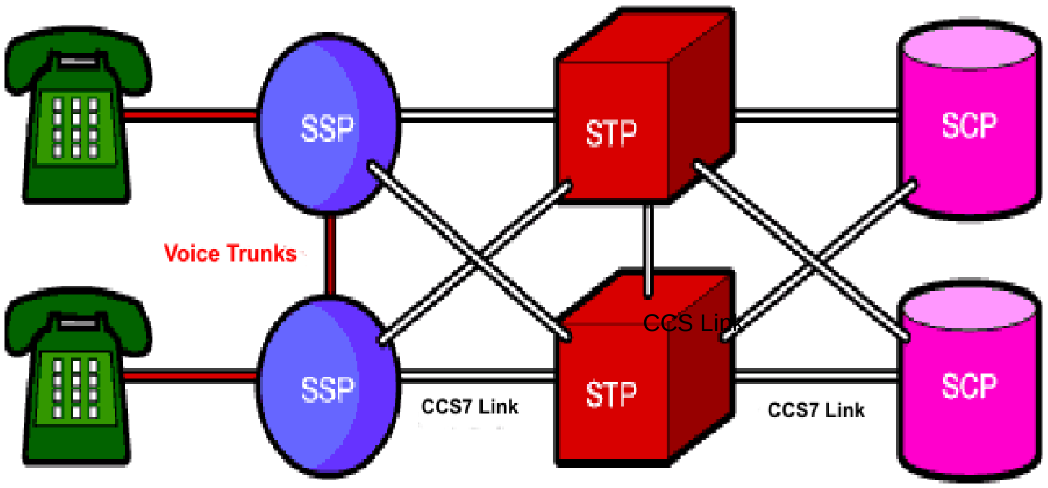
6.3 Signalling Points

Each signalling point in the CCS7 network is uniquely identified by a numeric **point code**. Point codes are carried in signalling messages exchanged between signalling points to identify the source and destination of each message. Each signalling point uses a routing table to select the appropriate signalling path for each message.

There are three kinds of signalling points in the CCS7 network (Figure. 1):

- **SSP** (Service Switching Point)
- **STP** (Signal Transfer Point)
- **SCP** (Service Control Point)

Figure 1: CCS7 Signalling Points



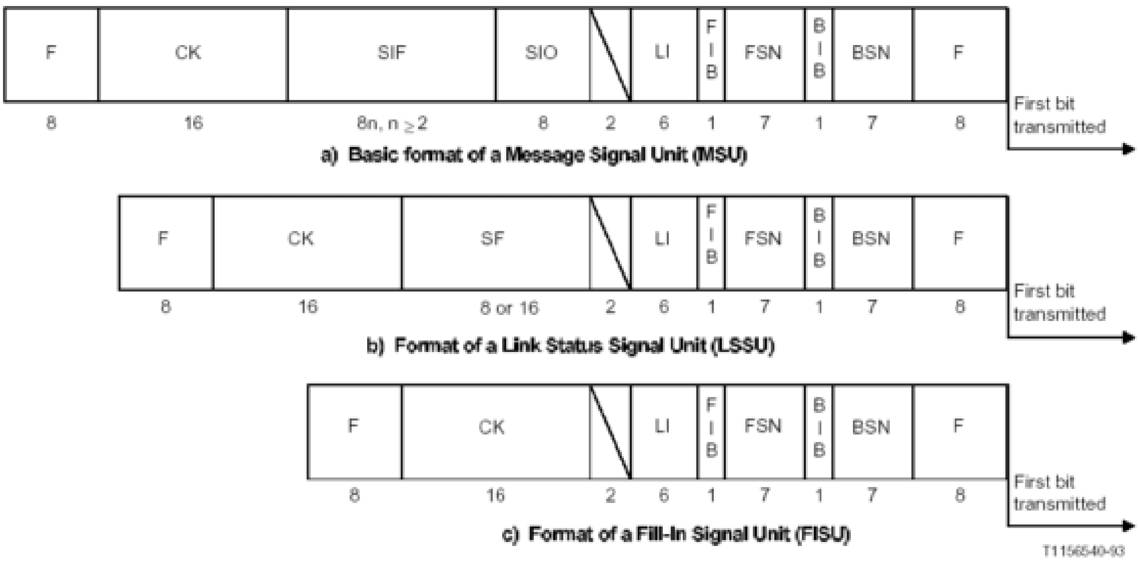
SSPs are switches that originate, terminate, or tandem calls. An SSP sends signalling messages to other SSPs to setup, manage, and release voice circuits required to complete a call. An SSP may also send a query message to a centralized database (an SCP) to determine how to route a call (e.g., a free 800 call). An SCP sends a response to the originating SSP containing the routing number(s) associated with the dialed number. An alternate routing number may be used by the SSP if the primary number is busy or the call is unanswered within a specified time. Actual call features vary from network to network and from service to service.

Network traffic between signalling points may be routed via a packet switch called an STP. An STP routes each incoming message to an outgoing signalling link based on routing information contained in the CCS7 message. Because it acts as a network hub, an STP provides improved utilization of the CCS7 network by eliminating the need for direct links between signalling points. An STP may perform global title translation, a procedure by which the destination signalling point is determined from digits present in the signalling message (e.g., the dialled 800 numbers, calling card number, or mobile subscriber identification number). An STP can also act as a "firewall" to screen CCS7 messages exchanged with other networks.

Because the CCS7 network is critical to call processing, SCPs and STPs are usually deployed in mated pair configurations in separate physical locations to ensure network-wide service in the event of an isolated failure. Links between signalling points are also provisioned in pairs. Traffic is shared across all links in the linkset. If one of the links fails, the signalling traffic is rerouted over another link in the linkset. The CCS7 protocol provides both error correction and retransmission capabilities to allow continued service in the event of signalling point or link failures.

7. Signal unit format

Three types of signal unit are differentiated by means of the length indicator contained in all signal units, i.e., message signal units, link status signal units and fill-in signal units. Message signal units are retransmitted in case of error, link status signal unit and fill-in signal units are not. The basic formats of the signal units are shown in ITU-T **Recommendation Q.703, Figure A1/Q.703 – Signal unit format 1.5 and 2.0 Mbit/s rates.**



BIB Backward Indicator Bit
BSN Backward Sequence Number
CK Check bits
F Flag
FIB Forward Indicator Bit
FSN Forward Sequence Number
LI Length Indicator
n Number of octets in the SIF
SF Status Field
SIF Signalling Information Field
SIO Service Information Octet

Figure 2: Signal unit format

The length of a signal unit varies from a minimum of 6 bytes to a maximum of 279 bytes. The processes of establishing a connection through the network or taking a connection down are accomplished in CCS7 signalling by the exchange of packetized messages called Signalling unit (SU) over Signalling Link (SL). The three types of SU are as follows;

- Message signal Units (MSUs) are the workhorses of CCS7 network. All signalling associated with call setup and tear down, database query and response, and CCS7 network management takes place-using MSUs.
- Link status Signal Units (LSSUs) are used to communicate information about the signal link between the nodes on either end of the link such as “Alignment Normal” or “Out of Service”
- Fill-In Signal Units (FISUs) are exchanged between signalling points when signalling link is free of traffic. FISUs themselves have no information payload. Their purpose is to occupy the links at those times when there are no LSSUs or MSUs to send.

8. Service Information Octet (SIO)

The service information octet of message signal units contains the service indicator and the sub-service field. The structure of the service information octet is shown below:

Table 1

DCBA	DCBA

Sub-service field (4 bits)	Service indicator (4 bits)

8.1 Service indicator

The service indicator codes for the international signalling network are allocated as follows:

Table 2

DCBA	
0000	Signalling network management messages
0001	Signalling network testing and maintenance messages
0010	Spare
0011	SCCP
0100	Telephone user part
0101	ISDN User Part
0110	Data User Part (call and circuit-related messages)
0111	Data User Part (facility registration and cancellation messages)
1000	Reserved for MTP Testing User Part
1001	Broadband ISDN User Part
1010	Satellite ISDN User Part
1011	Spare
1100	Spare
1101	Spare
1110	Spare
1111	Spare

8.2 Sub-service field

The sub-service field contains the Network Indicator (bits C and D) and two spare bits (bits A and B). If the Network Indicator (NI) is set to 00 or 01, the two spare bits, coded 00, are available for possible future needs that may require a common solution for all international User Parts. If the network indicator is set to 10 or 11, the two spare bits are for national use. They may be used for example, to indicate message priority, which is used in the optional flow control procedure in national applications. The Network Indicator provides for discrimination between international and national messages. It can also use, for example, for the discrimination between functionally two national signalling networks, each having different routing label structures. The network indicator codes are allocated as follows:

Table 3

DC	
00	International network
01	Reserved for international use
10	National network
11	Reserved for national use

The international spare code (01) should not use for implementing features, which shall be provided both internationally and nationally. In national applications, when the discrimination provided by the network indicator between international and national messages is not used, i.e. in a closed national signalling network seen from the signalling point of view, the completely sub-service field can be used independently for different User Parts.

9. Structure of international and national signalling networks

The service information octet of message signal units contains the service indicator and the sub-service field. The structure of the service information octet is shown below:

Table 4

DCBA	DCBA
Sub-service field (4 bits)	Service indicator (4 bits)

9.1 Service indicator

The service indicator codes for the international signalling network are allocated as follows:

Table 5

DCBA	
0000	Signalling network management messages
0001	Signalling network testing and maintenance messages
0010	Spare
0011	SCCP
0100	Telephone user part
0101	ISDN User Part
0110	Data User Part (call and circuit-related messages)
0111	Data User Part (facility registration and cancellation messages)
1000	Reserved for MTP Testing User Part
1001	Broadband ISDN User Part
1010	Satellite ISDN User Part
1011	Spare
1100	Spare
1101	Spare
1110	Spare
1111	Spare

9.2 Sub-service field

The sub-service field contains the Network Indicator (bits C and D) and two spare bits (bits A and B). If the Network Indicator (NI) is set to 00 or 01, the two spare bits, coded 00, are available for possible future needs that may require a common solution for all international User Parts. If the network indicator is set to 10 or 11, the two spare bits are for national use. They may use for example, to indicate message priority, which is used in the optional flow control procedure in national applications. The Network Indicator provides for discrimination between international and national messages. It can also use, for example, for the discrimination between functionally two national signalling networks, each having different routing label structures. The network indicator codes are allocated as follows:

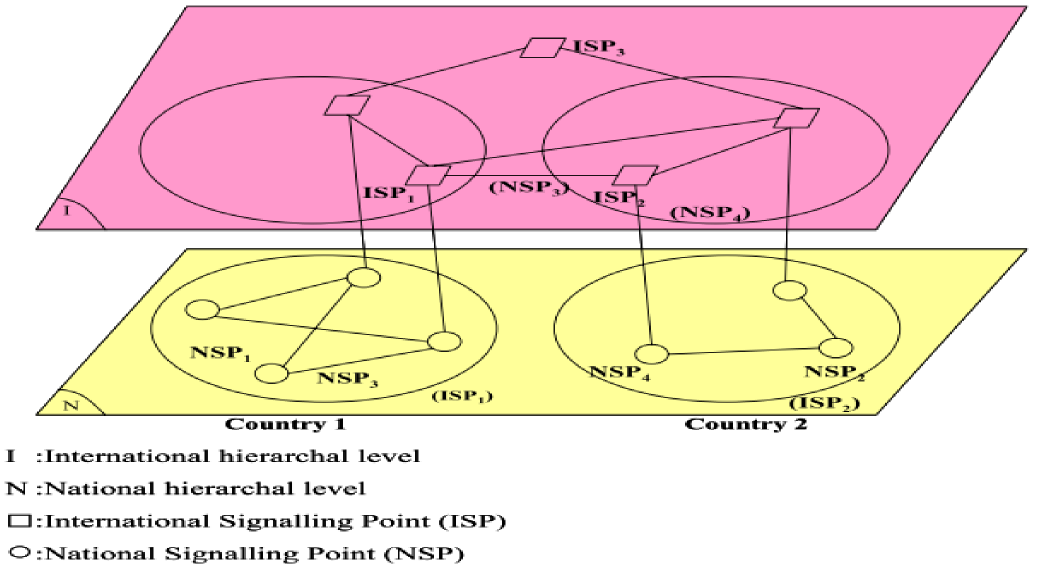
Table 6

DC	
00	International network
01	Reserved for international use
10	National network

11	Reserved for national use

The international spare code (01) should not use for implementing features, which shall be provided both internationally and nationally. In national applications, when the discrimination provided by the network indicator between international and national messages is not used, i.e. in a closed national signalling network seen from the signalling point of view, the completely sub-service field can be used independently for different User Parts.

Figure 3: **Structural of international and national signalling networks**



A signalling point (SP), including a signalling transfer point (STP), may assign to one of three categories:

- national signalling point (NSP) (signalling transfer point) which belongs to the national signalling network only (e.g., NSP1) and is identified by a signalling point code (Originating Point Code –OPC or Destination Point Code-DPC) according to the national numbering plan of signalling points;
- international signalling point (ISP) (signalling transfer point) which belongs to the international signalling network only (e.g., ISP3) and is identified by a signalling point code (OPC or DPC) according to the international numbering plan of signalling points;
- a node that functions both as an international signalling point (signalling transfer point) and a national signalling point (signalling transfer point) and therefore belongs to both the international signalling network and a national signalling network and accordingly is identified by a specific signalling point code (OPC or DPC) in each of the signalling networks.

10. International and national networks Criteria

10.1 The signalling network structure must be selected to meet the most stringent availability requirements of any User Part served by a specific network. The availability of the individual components of the network signalling links (signalling points and signalling transfer points) must be considered in determining the network structure.

10.2 In order to take account of signalling message delay considerations, regard should be given, in the structuring of a particular signalling network, to the overall number of signalling links (where there are a number of signalling relations in tandem) related to a particular user transaction (e.g., to a specific call in the telephone application).

10.3 For all messages for the same transaction (e.g., a telephone call), the MTP will maintain the same routing if the same signalling link selection code is used in the absence of failure. However, a transaction does not necessarily have to use the same signalling route for both forward and backward messages.

10.4 The number of signalling links used to share the load of a given flow of signalling traffic typically depends on;

- the total traffic load;
- the availability of the links;
- the required availability of the path between the two signalling points concerned; and
- the bit rate of the signalling links.

Load sharing requires at least two signalling links for all bit rates, but more may be needed at lower bit rates. When two links are used, each of them should be able to carry the total signalling traffic in case of failure of the other link.

10.5 In the international signalling network, the number of signalling transfer points between an originating and a destination signalling point should not exceed two in a normal situation. In failure situations, this number may become three or even four for a short period. This constraint is intended to limit the complexity of the administration of the international signalling network

10.6 A 14-bit code shall be used for the identification of signalling points.

10.7 For National Signalling Networks, no specific structures are required; however, Administrations should cater for the requirements imposed on a national network for the protection of international services in terms of network related user requirements, such as availability and performance of the network perceived by users.

10.8 The signalling points and the signalling transfer points, which are involved in a signalling of cross–border traffic, should belong to the international hierarchical level. When those signalling points or signalling transfer points are also involved in signalling of national traffic, they should belong to their national hierarchical level as well. Therefore, the double numbering of signalling point codes based on both the international and national numbering schemes should be required.

10.9 The Network Indicator in the service information octet as described in section 6 makes discrimination between international and national point codes.

11. National Signalling Point Code (NSPC) Format for PNG

This section describes the format of the code used to identify National Signalling Points Codes in the national CCS7 network, which is identified within the signalling system by the Network Indicator (NI) as follows:

- NI=10 is national network (currently used)
- NI=11 is national network (Reserved for other national networks, if needed.

The National Signalling Point Codes are the numbers that uniquely identify a network (NE) in a CCS7 network.

The format of the 14-bit binary code used for the identification of national signalling points. The 14 bits of NSPC are first converted to a five- digit decimal number denoted ABCDE. That will range from 00000 to 16383. The NSPC (ABCDE) decimal number will be divided into two fields. The first field will be consisting of three decimal digits (ABC) representing the Network Identity. The network identity will have 164 blocks, 163 of which has the capacity of 100 codes and one (#164) with a capacity of 83 codes.

The second field will be consisting of two decimal digits (DE) representing the signalling point code. Each block of (DE) will have a capacity of 100 signalling point codes.
The NSPC structure is illustrated below:

Table 7

Network Identity	Signalling Point Code
ABC	DE
3 digits	2 digits
Where ABC = 000 to 163	Where DE = 00 to 99 for all ABC values except 163, DE = 00 to 83

Telikom National CCS7 signalling Point Codes as at October, 2005.

NOTE: For more detailed information on the NATIONAL SIGNALLING POINT CODES, please contact Numbering and Network Section – Resource Planning Branch.

Table. 8

ISPC ID (Designation)	ISPC CODES
PomG	5-074-4
LaeG	5-074-3
Digicel	5-074-5

ISPC is the signalling point code for the international network and the NSPC is the national or local signalling point code.

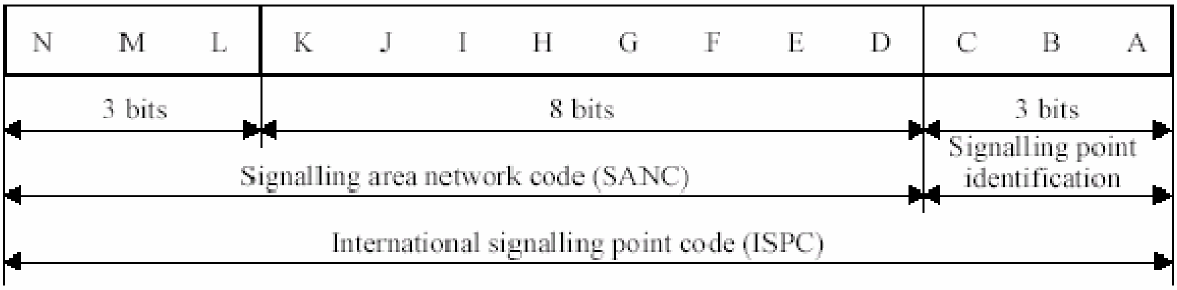
12. International Signalling Point Code (ISPC) Format

This section describes the format of the code used to identify international signalling points in the international CCS7 network which is identified by the Network Indicator NI=00.

The format of the 14-bit binary code used for the identification of international signalling points is illustrated below. The binary code is represented by three (3) decimal numbers as follows:

- The first indicating the three (3) most significant bits (NML), with a range of 0 to 7;
- The second indicating the following eight (8) bits (K-D), with a range of 000 to 255; and
- The third consisting of the three (3) least significant bits (CBA), with a range of 0 to 7.

The combination of the fields containing bits NML and bits K-D is regarded as the Signalling Area/Network Code (SANC). The three (3) bits (CBA) identify a specific signalling point which when combined with the SANC forms the 14-bit ISPC (e.g., 2-068-1).



For PNG Signalling Area/Network Code (SANC) is 5-074

13. Criteria for the assignment of an ISPC

13.1 The signalling point operator is to apply using ISPC application form to the NICTA.

13.2 The signalling point operator is to certify conformance to the NICTA statutes.

13.3 The signalling point operator has put into service or is about to put into service a signalling point having at least one MTP signalling relation in the international signalling network.

13.4 The signalling point operator is to comply with relevant ITU-T Recommendations concerning CCS7.

13.5 The signalling point operator is to provide NICTA with the following information:

- unique name of signalling point that may include location (city/town);
- name of (former) signalling point operator;
- contact person;
- nature of use in the network (more than one function may apply):
    - STP,
    - SEP (SP without STP function)
    - SCCP relay,
    - ISC,
    - GMSC,
    - LR,
    - OMC,
    - SCP,
    - SSP,
- signalling point manufacturer/type;
- physical address of the signalling point;
- in-service date of the signalling point (month/year);
- identification of at least one planned MTP signalling relation:
    - name and address of distant signalling point,
    - location of distant signalling point,
    - ISPC of distant signalling point, if known.

13.6 The signalling point operator is to confirm that the requested ISPC shall be placed in service within the 12 months starting from the date of the assignment.

14. Criteria for the assignment of an NPSC

14.1 The signalling point operator is to apply in writing to the NICTA.

14.2 The signalling point operator is to certify conformance to the NICTA statutes.

14.3 The signalling point operator is to comply with relevant ITU-T Recommendations concerning CCS7.

14.4 The signalling point operator is to provide the NICTA with the following information:

- name of (former) signalling point operator;
- contact person;
- nature of use in the network
- signalling point manufacturer;
- physical address of the signalling point;
- in-service date of the signalling point (month/year);

14.5 The signalling point operator is to confirm that the requested NSPC shall be placed in service within 12 months starting from the date of the assignment**.**

15 Basic principles and Assignment Procedures for SANC/ISPC

15.1 SANC/ISPC resources are to be assigned by TSB within ITU to a Member State, Country or geographical area.

15.2 The SANC/ISPC resource should be managed in such a manner as to ensure adequate capacity to meet the demand for the resource.

15.3 SANC/ISPC resources should be efficiently utilized and managed (e.g., only a single ISPC is to be assigned to a signalling point).

15.4 SANC/ISPC resources are to be assigned with fairness and equity.

15.5 Assignment confers use of the SANC and ISPC resource but does not imply ownership by the Member State and signalling point operator, respectively.

15.6 Signalling point codes for the national level and the international level are assigned separately. The assignment of a point code in a national network does not automatically entitle the code holder to an ISPC.

15.7 An ISPC(s) is to be assigned, as required, to signalling point operators by each Member State's designated Regulator (NICTA) in accordance with the rules and procedures of the Member State. ISPC assignments will be on an individual ISPC basis and not on a SANC basis. NICTA will notify the Director of the TSB of the assignment.

15.8 The SANC ranges beginning with 0 and 1 (identified by bits NML in section ten are reserved for future use).

15.9 A signalling point is assigned only one ISPC (A signalling point being a part of more than one signalling network, e.g., when serving as an international gateway, should be assigned a signalling point in each signalling network).

15.10 An ISPC(s) may be assigned by the Authority for test purposes. However, this assignment should not be considered a permanent one and may be subject to reassignment as necessary.

15.11 An ISPC derived from a SANC assigned to a Member State shall be used within the territory of PNG.

15.12 ISPCs are not transferable between signalling point operators. ISPCs may not be sold, licensed or traded by the signalling point operators. ISPCs may not be transferred, except in the case of a merger, acquisition, divestiture, or joint venture. The signalling point operators shall notify the NICTA of any such transfer.

16. NICTA Responsibility

16.1 Assign or withdraw an ISPC(s) and NSPC(s).

16.2 Notify the Director of the TSB of the assignment/withdrawal within 90 days. NICTA is encouraged to respond to a request for an ISPC within 90 days from receipt of the request. Assignment of an additional SANC(s) requires assignment of 75 percent of the ISPCs in all SANCs previously assigned.

16.3 Provide the following information to the Director of the TSB on signalling point assignments or withdrawals:

 ISPC assigned or withdrawn;
 Unique name of signalling point that may include location (city/town);
 Name of (former) signalling point operator;

16.4 An ISPC assignment should be withdrawn if the signalling point operator to whom the ISPC was assigned has not placed the ISPC into service within the period as established in accordance with 12 months. However, there may be extenuating circumstances (e.g. the vendor missed installation date, the distant end was not ready, etc.) in which case NICTA should be contacted to establish a new in-service date or other resolution.

16.5 Notify the Director of the TSB within 90 days, of any change in the published information provided in accordance with paragraph 3 above.

16.6 NICTA may withdraw of ISPCs/NSPC(s) in the following cases:

- ISPC/NSPC is being used in a different way from that for which it was assigned.
- Resource is being used by a signalling point operator other than the one to whom t/NSPC was assigned (i.e. a transfer was made without NICTA knowledge).
- Assigned ISPC/NSPC is no longer in use or required by the signalling point operator. 14.7 ISPCs/NSPC, which has been withdrawn, should have 6 months ageing period before becoming available for reassignment.

17. Operators Responsibility

17.1 The signalling point operator should inform NICTA of any change of information that was requested.

17.2 The signalling point operator should inform the NICTA within 90 days, about any changes such as its name, its registered office, information provided to NICTA, the name of its contact person or the location where the signalling point is in operation, etc.

17.3 The signalling point operator shall assure that the SPC resources allocated to him utilized efficiently.

17.4 The signalling point operator shall fulfil all criteria mentioned in section 11 and 12.

18. Allocation process

18.1 The ISPC will be allocated to the signalling point operator in a block of one code.

18.2 The NSPC will be allocated to the signalling point operator in a block of hundred codes or ten codes or one code as per requirements.

18.3 The signalling point operator shall submit after utilization of existing capacity has reached 80%.

18.4 NICTA will make the allocation within a period of 45 calendar days following receipt of a complete application that contains all of the relevant information. The period referred to above may be exceeded where:

a) additional information is required from the signalling point operator.

b) there are significant issues relating to the application that cannot be reasonably handled within that period.

18.5 Where NICTA considers that an increase to the specified 45-day period after receipt of a complete application is required, then the NICTA will inform the signalling point operator in writing of the revised period.

18.6 The signalling point operator in PNG may apply to NICTA for SPC allocation using the forms in Annex (1) and Annex (2).

19. Standards

SPCs shall conform to relevant and applicable international standards. Particular attention is drawn to the following ITU-T Recommendations:

Q.704 Signalling Network Functions and Messages
Q.705 Signalling Network Structure
Q.708 Numbering of International Signalling Point Codes

Annex (1)

FORM SPC 1: Application form for ISPC allocation

Name of the signalling point operator:
………
Registered business name (if different):
………
Postal Address:
………
…... ……………………………………………………………………………………………………..
Registered office address (if different):
………
………
Contact Person Name
………
Telephone number
………
Facsimile number
………
E-mail address
………
Description of the allocation requirement

ISPC 3-8-3 Code (Note#1)	ISPC Unique name of the Signalling Point (Note#2)	Location (Note#2)	Nature use (Note#2)	DECIMAL (Note#1)	BINARY (Note#1)

Note #1: to be filled by NICTA
Note #2: to be filled by signalling point operator
ISPC Unique name of the Signalling Point: means an abbreviated name for signalling location (e.g., POMG).
Location: means Region/City/village
Nature use: means International Gateway, Exchange or STP
Note: More information can be attached in a separate table

Estimated starting date of service
………
.... ……..
details of the existing utilization of the current allocations and the anticipated exhaust date. (Note: More information can be attached in a separate document)
………
………
………
………

Declaration
I certify my conformance to NICTA statutes and the information provided in this application is true and correct.

Signature of authorized person ……………………………………………………………………….

Name ……………………………………………………………..……

Position ……………………………………………………….............................……………………

Date ………………………………………………………..................………….......…………………

Annex (2)

FORM SPC 2: Application form for NSPC allocation

Name of the signalling point operator:

……………………………………………………………………………………………..........……..........………

Registered business name (if different):

……………………………………………………………………………………………..........……..........………

Postal Address:

…………………………………………………………………………………………..............……............………
.. ……………………………………………………………………………………………........……...........……….

Registered office address (if different):

……
…………………………………………………….........................………………..............………

Contact Person Name

……………………………………………………………………………...........................…………………

Telephone number

………………………………………………………………….............……............……………………

Facsimile number

………………………………………………………………………………......................…………………

E-mail address

…………………………………………………………..........……………….........…………………

Description of the allocation requirement

NSPC (Note #1)	Description (Note #2)	Name (Note #2)	Location (Note #2)	Network element (Note #2)	Network element type (Note #2)

Note #1: to be filled by NICTA
Note #2: to be filled by signalling point operator
ISPC Unique name of the Signalling Point: means an abbreviated name for signalling location (e.g., BKOD).
Location: means Region/City/village
Nature use: means International Gateway, Exchange or STP
Note: More information can be attached in a separate table

Estimated starting date of service

………………………………………………………………….....................……………………........
.... …………………………………………………………………………………………………...........

details of the existing utilization of the current allocations and the anticipated exhaust date.
(Note: More information can be attached in a separate document)

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Declaration

I certify my conformance to NICTA statutes and the information provided in this application is true and correct.

Signature of authorized person …………………………..............................………………………

Name ……………………………………..................…........…………………………...……

Position ………………………………………..................………........………………………

Date ………………………………………….................……………........…………………

Annex (3)

FORM SPC3: Notification of Assignment/Withdrawal of ISPC for CCS7

To be returned to ITU/TSB Fax No.: +41 22 730 5853/ E-mail: tsbtson@itu.int

Notification of Assignment or Withdrawal of International Signalling Point Codes (ISPC) for Signalling System No. 7

(According to ITU-T Recommendation Q.708)

This form should be used to notify the Director of the TSB of ISPCs that have been assigned or withdrawn by a Member State since the last notification.

Country/Area: ____

Member State Organisation: ____

Member State Contact-person **Name**:

Address:

____

Tel: ________________ **Fax**: ________________ **E-mail**: ____________________

TABLE A.1/Q.708

ISPC	**Unique name of the Signalling Point**	**Name of the Signalling Point Operator**	**Country where Signalling Point is to be put into service under subclause 7.9**[a)]

Annex (4)
Common Channel Signalling No. 7 (CCS7) Background

1. Basic Signalling Functions

The overall objective of CCS7 is to provide an internationally standardized general-purpose common channel signalling (CCS) system:

- optimized for operation in digital telecommunications networks in conjunction with stored program-controlled exchanges;
- that can meet present and future requirements of information transfer for inter-processor transactions within telecommunications networks for call control, remote control, and management and maintenance signalling;
- that provides a reliable means for transfer of information in correct sequence and without loss or duplication.

The signalling system shall meet requirements of call control signalling for telecommunication services such as the telephone, ISDN and circuit switched data transmission services. It can also be used as a reliable transport system for other types of information transfer between exchanges and specialized centres in telecommunications networks (e.g., for management and maintenance purposes). The system is thus applicable for multipurpose uses in networks that are dedicated for
particular services and in multi-services networks. The signalling system is intended to be applicable in international and national networks.
The scope of CCS7 encompasses both circuit related and non-circuit related signalling.

Examples of applications supported by CCS7 are:
- PSTN;
- ISDN;
- Interaction with Network Databases, Service Control Points for service control;
- Mobiles Networks (Public Land Mobile Network);
- Operations, Administration and Maintenance of Networks.

The signalling system is optimized for operation over digital channels. The system is suitable for use on point-to-point terrestrial and satellite links.

1.1 Supervision Function (Line Signalling)

- Line Signalling is concerned with the change of the “States” of lines or links. It is simple and used throughout the call.
- Examples of Line States are, Idle, Seized, Alerting, Conversation, Time-supervision before Lockout, Lockout.
- Examples of Line Signals are Seizure, Answer, Clear forward, Clear-backward, Acknowledgement, Ringing signal.
- Line signalling is used to control call charging.

1.2 Addressing Function (Register Signalling)

Register Signalling is concerned with the exchange of Numerical (or other forms of addressing) information in order to reach the location of the Called Subscriber, and possibly provide information about the address of the calling Subscriber.

1.3 Operational Functions (e.g., Services & Management)

Operation functions are supported by the signalling systems to extend the offering of services and their billing across the network. This includes exchange of information for registration of subscribers with their entitlements and updating of their Service Capabilities. Also, exchange of information regarding network congestion and faulty situations, as well as faulty processors or circuits.

2. CCS7 Protocol Stack

The hardware and software functions of the CCS7 protocol are divided into functional abstractions called "levels". These levels map loosely to the Open Systems Interconnect (OSI) 7-layer model defined by the International Standards Organization (ISO).

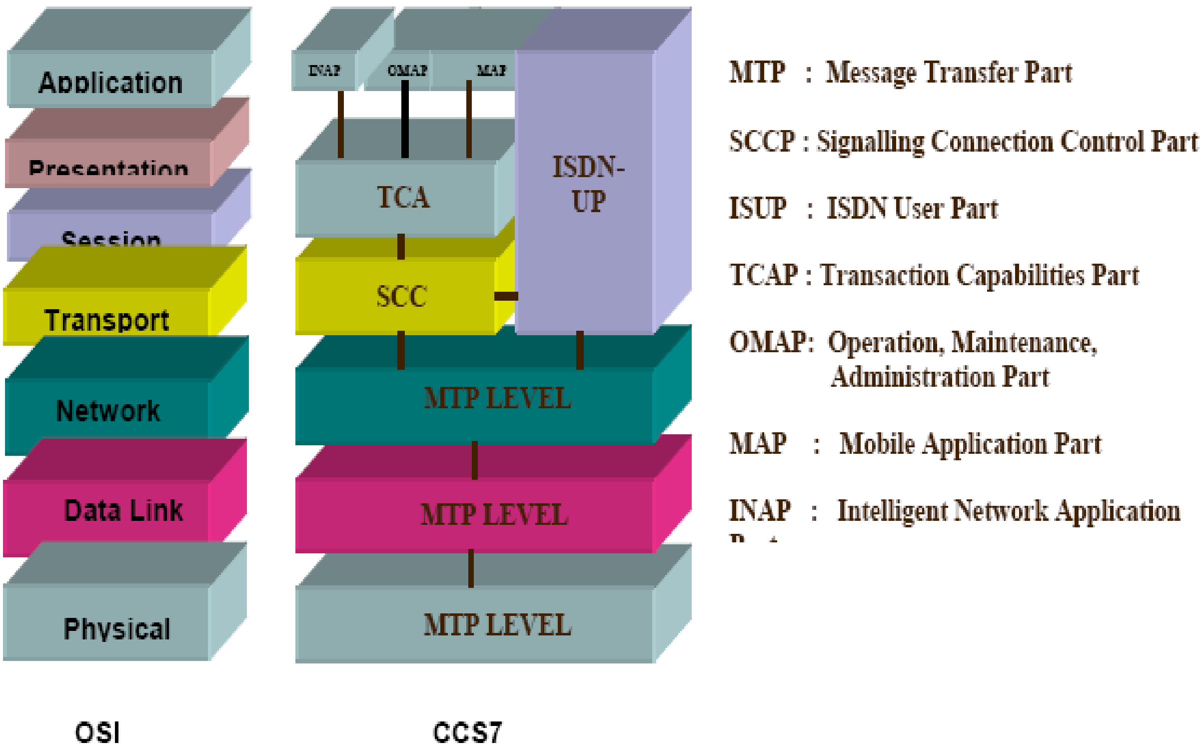

Figure A: The OSI Reference Model and the CCS7 Protocol Stack

2.1 Message Transfer Part

The Message Transfer Part (MTP) is divided into three levels.

2.1.1 MTP Level 1

The lowest level, MTP Level 1, is equivalent to the OSI Physical Layer. MTP Level 1 defines the physical, electrical, and functional characteristics of the digital signalling link. Physical interfaces defined include E-1 (2048 kb/s; 32*64 kb/s channels), DS-1 (1544 kb/s; 24*64kb/s channels), V.35 (64 kb/s), DS-0 (64 kb/s), and DS-0A (56 kb/s).

2.1.2 MTP Level 2

MTP level 2 ensures accurate end-to-end transmission of a message across a signalling link. Level two implements flow control, message sequence validation, and error checking. When an error occurs on a signalling link, the message (or set of messages) is retransmitted. MTP Level 2 is equivalent to the OSI Data Link Layer.

2.1.3 MTP Level 3

MTP Level 3 provides message routing between signalling points in the CCS7 network. MTP Level 3 re-routes traffic away from failed links and signalling points and controls traffic when congestion occurs. MTP Level 3 is equivalent to the OSI Network Layer.

2.2 ISDN User Part (ISUP)

The ISDN User Part (ISUP) defines the protocol used to set-up, manage, and release trunk circuits that carry voice and data between terminating line exchanges (e.g., between a calling party and a called party). ISUP is used for both ISDN and non-ISDN calls. However, calls that originate and terminate at the same switch do not use ISUP signalling.

2.3 Signalling Connection Control Part (SCCP)

SCCP provides connectionless and connection-oriented network services and global title translation (GTT) capabilities above MTP Level 3. A global title is an address (e.g., a dialled 800 numbers, calling card number, or mobile subscriber identification number) that is translated by SCCP into a destination point code and subsystem number. A subsystem number uniquely identifies an application at the destination signalling point. SCCP is used as the transport layer for TCAP-based services.

2.4 Transaction Capabilities Applications Part (TCAP)

TCAP supports the exchange of non-circuit related data between applications across the CCS7 network using the SCCP connectionless service. Queries and responses sent between SSPs and SCPs are carried in TCAP messages. For example, an SSP sends a TCAP query to determine the routing number associated with a dialled 800 number and to check the personal identification number (PIN) of a calling card user. In mobile networks (GSM), TCAP carries Mobile Application Part (MAP) messages sent between mobile switches and databases to support user authentication, equipment identification, and roaming.

2.5 Operations, Maintenance and Administration Part (OMAP)

The Operations, Maintenance and Administration Part (OMAP) provide procedures related to operations and maintenance functions. OMAP corresponds to the OSI model’s Application Layer 7.

2.6 Mobile Application Part (MAP)

In GSM networks, the MAP rides on top of CCS7, allowing Visitor Location Register (VLR) to Home Location Register (HLR) (and HLR to VLR) communications. Mobile Application Part (MAP) messages sent between mobile switches and databases to support user authentication, equipment identification, and roaming are carried by TCAP. In mobile networks when a mobile subscriber roams into a new mobile switching centre (MSC) area, the VLR requests service profile information from the subscriber's HLR using MAP (mobile application part) information carried within TCAP messages.

2.7 Intelligent Network Application Part (INAP)

The Global Communications Environment provides an opportunity for the definition of new, enhanced services requiring support from the Intelligent Network. These services may cross several different networks (e.g., traditional wireless, traditional wireline, IPbased wireless/wireline, etc.) and thus require additional features/capabilities that represent new requirements to be defined for the Intelligent Network Application Protocol (INAP).

New, Traditional and Non-Traditional Telecommunications Operators are entering the marketplace and they will represent new requirements to support new and evolving services that will need to interact with the INAP.

As these new services and capabilities are defined, new protocols will be required to provide the capabilities to deploy these services. Further, with the multiplicity of new services and the variations of these services based on the networks providing them, robust service/service feature interaction control mechanisms will need development to allow existing and new INAP features/capabilities to properly interact, thus insuring end-to-end service operation. Therefore, the Intelligent Network Applications Protocol (INAP) is required.

3. Signalling Network Configuration

3.1 Associated Mode Configuration

The following figure illustrates the simplest implementation of CCS7 signalling, that is, CCS7 signalling set up between two local exchanges using direct links between the exchanges.

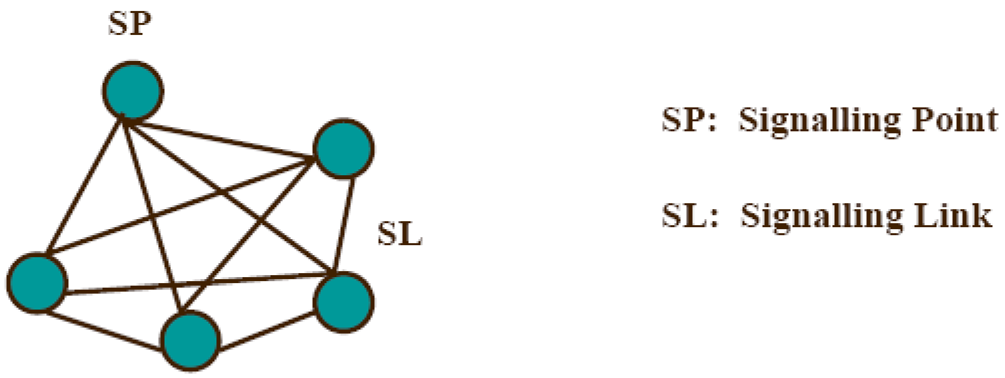

Figure B: **Associated Mode Configuration**

In the above configuration, all signalling for connections established between the two exchanges occurs over the dedicated signalling link (SL). A Signalling Point (SP) is the interface in a CCS7 equipped exchange between the switch and CCS7 network. When exchanges employ direct CCS7 signalling, they are said to be operating in associated mode.

3.2 QUASI-ASSOCIATED Mode Configuration

In CCS7 networks of more than few nodes, it is usually more efficient to employ a tandem point for CCS7 Links. Such a tandem is called a Signal Transfer Point (STP).

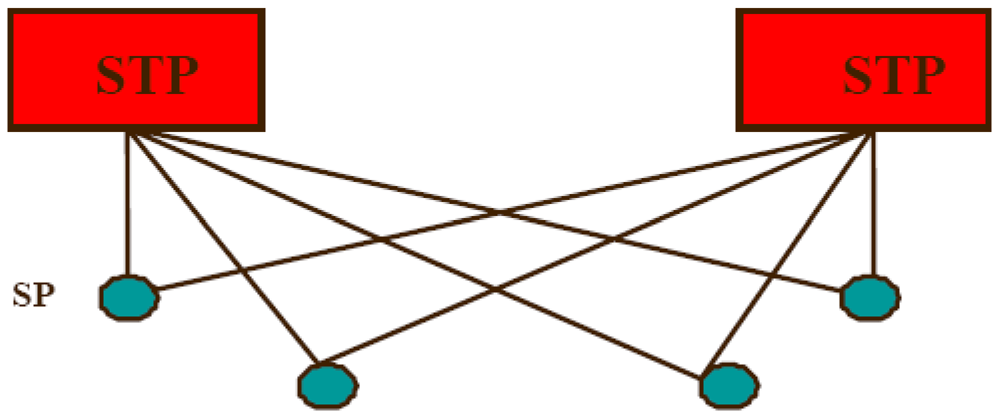

Figure C: **QUASI-Associated Mode Configuration**

The above figure illustrates local exchanges arranged such that the signalling messages tandem through STPs when exchanges route their signalling messages through STP's they are said to be operating in Quasi-Associated Mode.