

S-38.115 Signaling Protocol, Exercise 5

Deadline: Wed 26.3.2003 at 8:25 before the beginning of the exercise lecture
All late answers will be disregarded. Please, adhere to the deadline.

The answers are to be returned either to the exercise assistant (in person or via email to zhouyi@netlab.hut.fi) or, preferably, to a box underneath the lab's notice board on G-wing 2nd floor. Please write your name, student number and exercise number clearly in each answer page. Attention: for those who will return the exercises via email, please use the "Exercise x" as the subject in your email, where x is the series number of the exercise. And also write your name, student number and exercise number clearly in each answer page.

Task 1

A subscriber dials a six-digit number and each digit is keyed individually. Show the messaging flows for a successful call attempt and call release with ISUP. Describe briefly the function of each message.

Task 2

A subscriber dials a six-digit number and each digit is keyed individually. Show the messaging flow for an unsuccessful call attempt with ISUP, when the call ends with wrong keying after the second number. Describe briefly the function of each message.

Task 3

Use the information in Task1 & Task2, Lengths of the SS7 messages are in order of size:

- IAM 39 bytes
- REL 21 bytes (unsuccessful call)
- REL 16 bytes (successful call)
- SAM 16 bytes
- ACM 14 bytes
- ANM 12 bytes
- RLC 12 bytes

How many timeslots are required to serve SS7 traffic in setting up a successful call and unsuccessful call? Other MTP-2 messages than those mentioned above are not taken into account. (**Hints:** 1 timeslot = 1 Byte)

Task 4

Draw a detailed topology diagram (Take slide 12-13/Lecture Jan.31 as an example, including all the information specified in the following table) of the situation in the network using the information given below in Figure 1, Figure 2 and Figure 3.

<Hints:>

- 1) Refer to lecture slides: Jan.31.2003/CCS 7, MTP, SCCP >
- 2) Refer to the Appendix at the end of this exercise for the detail information about the each parameter
- 3) Fill in the following table (no exercise points for this question, but it helps you to grasp the most important information from the Figure1-3)

Local SP' s Name: _____, OPC_____

OPC	DPC	DPC Name	SP Type	SL(PCM-TSL)	SLS	SRS

- 4) Some Abbreviations:
 - a. SP --- Signalling Point
 - b. OPC --- Origination Point Code
 - c. DPC --- Destination Point Code
 - d. SL --- Signalling Link
 - e. PCM-TSL PCM-Timeslot
 - f. SLS --- Signalling Link Set
 - g. SRS --- Signalling Route Set

<ZNCI;

```

DX 200      MSC03      1998-09-13  09:30:45
INTERROGATING SIGNALLING LINK DATA

```

LINK	LINK SET	PCM-TSL	UNIT	TERM	LOG	LOG	PARAM
				TERM	UNIT	TERM	SET
0	16 HLR01	88-01	CCSU-2	1	0	4041H	1 0
1	16 HLR01	90-01	CCSU-0	3	0	4042H	0 0
2	17 BSC01	80-16	BSU-2	1	0	4131H	1 0
3	18 PSTN1	65-01	CCSU-2	0	0	4041H	0 0
4	19 BSC02	81-16	BSU-1	1	0	4132H	0 0
5	20 PSTN2	66-01	CCSU-2	2	0	4041H	2 0

COMMAND EXECUTED

Figure 1. Signalling link definitions in an MSC

<ZNSI:NAO;

```

EXECUTION STARTED
DX 200      MSC03      1998-09-13  09:30:55
INTERROGATING SIGNALLING LINK SET DATA

```

NET	SP CODE H/D	LINK SET	LS STATE	LINK	SLC	PRIO
NAO	0020/00032	18 PSTN1	AV	3	0	0
NAO	0064/00100	20 PSTN2	AV	5	0	0
NAO	0320/00800	17 BSC01	AV	2	0	0
NAO	0384/00900	16 HLR01	AV	0	0	0
				1	1	0
NAO	044C/01100	19 BSC02	UA	4	0	0

COMMAND EXECUTED

Figure 2. Signalling Link Set definitions in an MSC (five link sets, only the one towards the HLR contains more than one link)

```

<ZNRI:NA0;
DX 200 MSC03                1998-09-13 09:31:05
INTERROGATING SIGNALLING POINT DATA
SRS #1 NET SP CODE H/D  NAME      RS STATE  PAR SET
-----
NA0 0020/00032  PSTN1      AV        0
LOAD SHARING BETWEEN SIGNALLING ROUTES DENIED
ROUTES: SP CODE H/D      NAME      STATE  PRIO
-----
        NA0 0020/00032  PSTN1  AV-EX   7
        NA0 0064/00100  PSTN2  AV-SP   6
SRS #2 NET SP CODE H/D  NAME      RS STATE  PAR SET
-----
NA0 0064/00100  PSTN2      AV        0
LOAD SHARING BETWEEN SIGNALLING ROUTES DENIED
ROUTES: SP CODE H/D      NAME      STATE  PRIO
-----
        NA0 0064/00100  PSTN2  AV-EX   7
        NA0 0020/00032  PSTN1  AV-SP   6
SRS #3 NET SP CODE H/D  NAME      RS STATE  PAR SET
-----
NA0 0320/00800  BSC01      AV        1
LOAD SHARING BETWEEN SIGNALLING ROUTES DENIED
ROUTES: SP CODE H/D      NAME      STATE  PRIO
-----
        NA0 0320/00800  BSC01  AV-EX   0
SRS #4 NET SP CODE H/D  NAME      RS STATE  PAR SET
-----
NA0 0384/00900  HLR01      AV        0
LOAD SHARING BETWEEN SIGNALLING ROUTES DENIED
ROUTES: SP CODE H/D      NAME      STATE  PRIO
-----
        NA0 0384/00900  HLR01  AV-EX   0
SP Data NET SP CODE H/D      SP NAME  SP TYPE  STAND  COUNT  BIT LENGTS
-----
NA0 0BB8/03000  MSC3      STP      CCITT   1     14  OWN SP
SRS #5 NET SP CODE H/D  NAME      RS STATE  PAR SET
-----
NA0 044C/01100  BSC02      UA        1
LOAD SHARING BETWEEN SIGNALLING ROUTES DENIED
ROUTES: SP CODE H/D      NAME      STATE  PRIO
-----
        NA0 044C/01100  BSC02  UA-INS  0
COMMAND EXECUTED
  
```

Figure 3. Signalling Route Set definitions in an MSC

Appendix:

Legend Figure 1	
LINK	signalling link number
LINK SET	number and name of the signalling link set which the link is assigned to (see next chapter)
PCM-TSL	external PCM number and time slot of the link
UNIT	type and index of the signalling unit handling the link
TERM	index of the signalling terminal (automatically assigned)
TERM FUNCT	ordering number of the link within a multichannel terminal (automatically assigned, e.g. AS7-U: 0 through 3)
LOG UNIT	internal unit identification (automatically assigned)
LOG TERM	ordering number of the link within a signalling unit (automatically assigned)
PARAM SET	number of the selected signalling link parameter set

Legend Figure 2	
NET	Signalling network the SLS is defined for
POINT H/D	SPC of the neighbour node in hexadecimal and decimal format
LINK SET	Name and number of the SLS defined
LS STATE	State of the SLS (AV: available, UA: unavailable); as soon as at least one link is active, the SLS automatically becomes available
LINK	Signalling link number (internal identification)
SLC	Signalling link code (external identification)
PRIO	Priority (max. 0, min. 15) of signalling link within link set

Legend Figure 3	
ROUTE SET DATA	Identification of the destination
NET	Signalling network the SRS is defined for.
SP CODE H/D	DPC (destination point code) in hex and decimal format.
NAME	Name given for the destination in the local system.
RS STATE	State of the SRS (explained below); as soon as at least one route is available, the SRS automatically becomes available.
PAR SET	Number of the selected SRS parameter set. (1 = A interface)
info line	When creating the route set, the sharing of the signalling load among all routes of that route set can be allowed or denied; several notes can be output here.
ROUTE DATA	Identification of the neighbour
SP CODE H/D	STPC (transfer point code) in hex and decimal format.
NAME	Name given for the neighbour in the local system.
STATE	State of the SR (explained below) as manually set with MML.
PRIO	Priority of the route (max. 7, min. 0) within the route set; unless load sharing is agreed and there is more than one route with the highest priority, the route with the highest priority carries the traffic.
POINT DATA	Identification of the own signalling point
NET	Signalling network the own SP is defined in.
SP CODE H/D	Own SPC in hex and decimal format.
SP NAME	Own name as given locally.
SP TYPE	Indicates if the own SP is created as an end point (SEP) or a transfer point (STP).
SS7 STAND	Indicates the used signalling standard: mainly if the SPC is composed according to CCITT rules (14bit SPC), ANSI or CHINA standards (both 24 bit SPC).
SUBFIELD INFO	Tells about the grouping of the SPC bits into max 3 groups (subfields) and how many bits per subgroup are allocated.

Signalling Link States and Substates

Main state - substate 1 - substate 2	Name of the state	Meaning and the change made
AV-EX	Available-executing	Link is working normally.
UA-AD	Unavailable-activation denied	Operator has taken the link out of use and has denied the activation.
UA-TST	Unavailable-testing	User has started a data link test and only test traffic can be transferred by the link, while no signalling traffic is allowed.
UA-INU	Unavailable-deactivated by user	Operator has taken the link out of use. To activate the link use command NLC.
UA-INS	Unavailable-deactivated by system	System has taken the link out of use. Link has not completed the initial alignment or the signalling link test procedure successfully.
UA-BLU	Unavailable-blocked by user	User has blocked the signalling link.
UA-BLR	Unavailable-blocked by remote exchange	Remote end exchange has blocked the signalling link, or there is a processor outage condition at remote end.
UA-BLB	Unavailable-blocked by user and remote exchange	The signalling link has been blocked at both ends.
UA-IBL	Unavailable-inhibited local	User has inhibited the link.
UA-IBR	Unavailable-inhibited remote	Remote end has inhibited the link.
UA-IBB	Unavailable-inhibited local and remote	The signalling link is inhibited at both ends.
UA-INU-IBL	Unavailable-deactivated by user-inhibited local	User has deactivated and inhibited the signalling link.
UA-INU-IBR	Unavailable-deactivated by user-inhibited remote	User has deactivated and the remote end has inhibited the signalling link.
UA-INU-IBB	Unavailable-deactivated by user-inhibited local and remote	User has deactivated and inhibited and the remote end has inhibited the signalling link.
UA-INS-IBL	Unavailable-deactivated by system-inhibited local	System has deactivated and user has inhibited the signalling link.
UA-INS-IBR	Unavailable-deactivated by system-inhibited remote	System has deactivated and remote end has inhibited the signalling link.
UA-INS-IBB	Unavailable-deactivated by system-inhibited local and remote	System has deactivated and user has inhibited the signalling link at both ends.
UA-BLU-IBL	Unavailable-blocked by user-inhibited local	User has blocked and inhibited the signalling link.
UA-BLU-IBR	Unavailable-blocked by user-inhibited remote	User has blocked and remote end has inhibited the signalling link.
UA-BLU-IBB	Unavailable-blocked by user-inhibited local and remote	User has blocked the signalling link and the signalling link is inhibited at both ends.

Main state - substate 1 - substate 2	Name of the state	Meaning and the change made
UA-BLR-IBL	Unavailable-blocked by remote exchange-inhibited local	The signalling link is blocked at remote end and user has inhibited the signalling link.
UA-BLR-IBR	Unavailable-blocked by remote exchange-inhibited remote	The signalling link is blocked and inhibited at remote end.
UA-BLR-IBB	Unavailable-blocked by remote exchange-inhibited local and remote	The signalling link is blocked at remote end and inhibited by user at both ends.
UA-BLB-IBL	Unavailable-blocked by user and remote exchange-inhibited local	User has blocked and inhibited the signalling link and the remote end has blocked the signalling link.
UA-BLB-IBR	Unavailable-blocked by user and remote exchange-inhibited remote	User has blocked the signalling link and the signalling link is blocked and inhibited at remote end.
UA-BLB-IBB	Unavailable-blocked by user and remote exchange-inhibited local and remote	The signalling link is blocked and inhibited at both ends.

Signalling Route States and Substates

Main state - substate	Name of the state	Meaning/Reason
AV-EX	Available-executing	The signalling route is transferring signalling traffic.
AV-SP	Available-spare	The signalling route does not transfer signalling traffic but can be taken into use.
UA-INU	Unavailable-deactivated by user	User has deactivated the route.
UA-INS	Unavailable-deactivated by system	The system has deactivated the route.
UA-INR	Unavailable-deactivated by remote exchange	The remote end has deactivated the route.
UA-AD	Unavailable-activation denied	Activation of the route is denied.
AR-EX	Available but restricted-executing	The signalling route has received a "transfer restricted" message from the transfer point, which lowers the priority of the route.
AR-SP	Available but restricted-spare	Same as above for a spare route.