

Signaling in the V5.2 -interface

Lecture on March 22, 2001

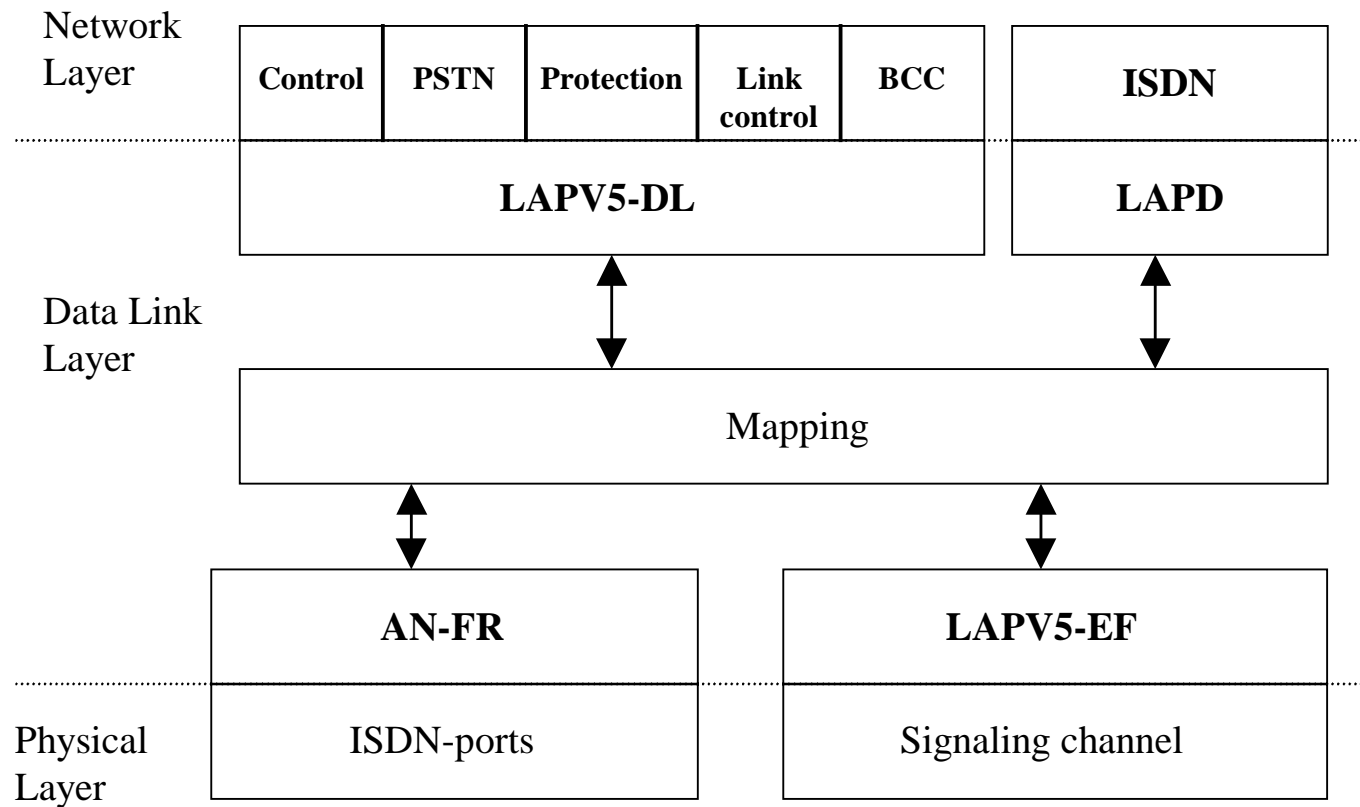
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About the contents of this lecture

- Here are some extracts from the lecture
- To get an overall picture of V5.2 -interface it is recommended to look also prof. Kantola's slides.

V5.2 -Architecture of the Signaling Messages at Layer 3



V5.2 -Signaling Messages at Layer 3

- **CONTROL PROTOCOL**

- **During the start-up procedure, the control protocol with the help of LAPV5 creates all the signaling channels which were defined when the V5.2 -interface was created.**
- **The configuration information of these channels is compared during the start-up, it must be the same in both access node and local exchange ends.**
- **After the start-up procedure has been completed, all the relevant user ports are set to operational state.**
- **If a signaling channel is lost, the control protocol asks the protection protocol to move the particular signaling protocol located on the lost channel to another time slot or even to another PCM line.**
- **The control protocol also handles the state of the user ports. E.g. if an ISDN subscriber activates his/her line, the port state changes automatically (Note! PSTN user ports are normally in operational state all the time).**

V5.2 -Signaling Messages at Layer 3

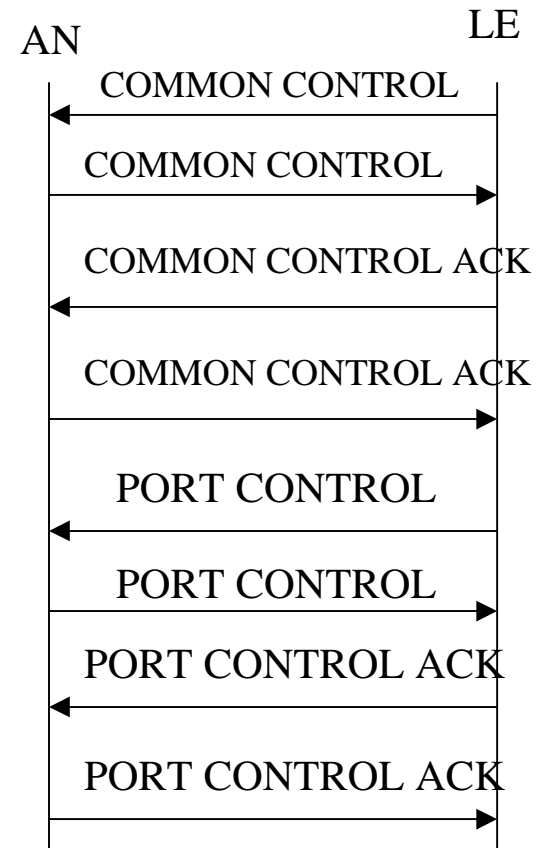
- **CONTROL PROTOCOLS**

- **COMMON CONTROL:**

- LE/COMMON CONTROL
 - AN/ COMMON CONTROL
 - LE/ COMMON CONTROL ACK
 - AN/ COMMON CONTROL ACK

- **PORT CONTROL:**

- LE/PORT CONTROL
 - AN//PORT CONTROL
 - LE/PORT CONTROL ACK
 - AN/ PORT CONTROL ACK



V5.2 -Signaling Messages at Layer 3

- **LINK CONTROL
PROTOCOL**

- Typically several 2 Mbit/s lines are used in one particular V5.2. - interface, therefore a link control protocol is needed.
- The link identification procedure is used to ensure that link_IDs are the same in both local exchange and access network ends.
- Controlling the link status in turn means handling of blocking and unblocking requests from peer entity or from the management.

LINK CONTROL:

LE/LINK CONTROL
AN/LINK CONTROL
LE/LINK CONTROL ACK
AN/LINK CONTROL ACK

V5.2 -Signaling Messages at Layer 3

- **BCC (Bearer Channel Connection) PROTOCOL**

- handles the bearer channel resources in a V5.2 -interface.
- The local exchange side entity decides which time slot will be used for the call and it informs the access node side entity about the time slot allocation.
- The BCC protocol in the access node side will then inform the PSTN protocol about the allocation.

BCC PROTOCOLS:

LE/ALLOCATION
AN/ALLOCATION-COMPLETE
AN/ALLOCATION-REJECT
LE/DEALLOCATION
AN/DEALLOCATION-COMPLETE
AN/DEALLOCATION-REJECT

AN/AUDIT
LE/AUDIT-COMPLETE

AN/AN-FAULT
LE/AN-FAULT-ACK
AN/PROTOCOL-ERROR

V5.2 -Signaling Messages at Layer 3

- **PROTECTION PROTOCOL**

- Provides a mechanism to protect active C-channels in the event of 2Mbit/s link failure.
- C-channel path is always provisioned in two time slots located in different PCM line, therefore it is still operational even if one link is broken
- In case of link failure, the protection protocol transfers all the active C-channels to the standby channels.
- Bearer channels are not protected, so subscriber connections on these channels will fail.

PROTECTION PRTOCOLS:

AN/SWITCH-OVER-REQUEST
LE/SWITCH-OVER-COMMAND
LE/OS-SWITCH-OVER-COMMAND
AN/SWITCH-OVER-ACK
AN/SWITCH-OVER-REJECT
LE/SWITCH-OVER-REJECT

AN/PROTECTION-PROTOCOL-
ERROR
AN/RESET-SN-ACK
LE/RESET-SN-ACK
AN/RESET-SN-COMMAND
LE/RESET-SN-COMMAND

V5.2 -Signaling Messages at Layer 3

- **PSTN PROTOCOL**
 - **The PSTN protocol in the access node side transmits and receives information about the analogue line state over the V5.2 -interface, e.g. on-hook, off-hook, decadic dialling, etc.**
 - **The PSTN protocol is the link for analogue subscribers to other call control entities in the local exchange side.**
 - **The national differences in PSTN signaling in different countries are defined in the national PSTN mapping documents, which describe message sequences and specific information elements used in a certain country**

V5.2 -Signaling Messages at Layer 3

- **PSTN PROTOCOL**

- SET-UP PHASE

- AN/ESTABLISH
 - LE/ESTABLISH
 - AN/ESTABLISH-ACK
 - LE/ESTABLISH-ACK

- ACTIVE PHASE

- AN/SIGNAL
 - LE/SIGNAL
 - AN/SIGNAL-ACK
 - LE/SIGNAL-ACK
 - LE/PROTOCOL-PARAMETER

TEAR DOWN PHASE

- AN/DISCONNECT
- LE/DISCONNECT
- AN/DISCONNECT-COMplete
- LE/DISCONNECT-COMplete

ANY TIME

- LE/STATUS-ENQUIRY
- AN/STATUS

Example of An Ordinary Call

AN

LE

```
Conn:1 Line:1 Timeslot:16          1 14:51:59.455
ENVELOPE FRAME:  .....!
RECEIVER READY

14:51:59.458                      Conn:1 Line:1 Timeslot:16          2
                                   ENVELOPE FRAME:  .....!
                                   RECEIVER READY
                                   Conn:1 Line:1 Timeslot:16          3
14:51:59.460                      Conn:1 Line:1 Timeslot:16          4
                                   ENVELOPE FRAME:  .... H..00..
                                   INFO :  .. H..00..
                                   LINK CONTROL :  48 00 0A 30 30 01 80
Conn:1 Line:1 Timeslot:16          4 14:51:59.467
ENVELOPE FRAME:  ..... "
RECEIVER READY
Conn:1 Line:1 Timeslot:16          5 14:51:59.469
ENVELOPE FRAME:  .... "H..10..
INFO :  .. "H..10..
LINK CONTROL ACK :  48 00 0A 31 30 01 80
14:51:59.471                      Conn:1 Line:1 Timeslot:16          6
                                   ENVELOPE FRAME:  ..... "
                                   RECEIVER READY
Conn:1 Line:1 Timeslot:16          7 14:52:01.028
ENVELOPE FRAME:  .....H.....
INFO :  ....H.....
ESTABLISH
Protocol discriminator : 72 (48h)
L3addr : 500 (01F4h)
Steady-signal
- length : 1 (01h)
- off hook (loop closed)
```

Continued...

AN

LE

```
Conn:1 Line:1 Timeslot:16          8 14:52:01.030
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16          9 14:52:01.047
ENVELOPE FRAME: .....H...
INFO : ....H...
ESTABLISH ACK
Protocol discriminator : 72 (48h)
L3addr : 500 (01F4h)
Conn:1 Line:1 Timeslot:16          10 14:52:01.050
ENVELOPE FRAME: .....H.. @...B...
INFO : ....H.. @...B...
ALLOCATION
Protocol discriminator : 72 (48h)
BCC reference number
- LE created process
- value : 8 (0008h)
User port identification
- PSTN port application
- length : 2 (02h)
- length : 2 (02h)
- value : 500 (01F4h)
V5 time slot identification
- length : 2 (02h)
- link: 10 (0Ah)
- time slot: 2 (02h)
- override not requested
```

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```

AN
Conn:1 Line:1 Timeslot:16      11 14:52:01.052
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16      12 14:52:01.061
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16      13 14:52:01.072
ENVELOPE FRAME: .....H..!
INFO : ....H..!
ALLOCATION COMPLETE
Protocol discriminator : 72 (48h)
BCC reference number
- LE created process
- value : 8 (0008h)
Conn:1 Line:1 Timeslot:16      14 14:52:01.074
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16      15 14:52:01.970
ENVELOPE FRAME: ....."H..00..
INFO : ....."H..00..
LINK CONTROL : 48 00 0A 30 30 01 83
Conn:1 Line:1 Timeslot:16      16 14:52:01.972
ENVELOPE FRAME: .....$
RECEIVER READY
Conn:1 Line:1 Timeslot:16      17 14:52:01.975
ENVELOPE FRAME: ....."$H..10..
INFO : ....."$H..10..
LINK CONTROL ACK : 48 00 0A 31 30 01 83
Conn:1 Line:1 Timeslot:16      18 14:52:01.980
ENVELOPE FRAME: .....$
RECEIVER READY

```

AN

LE

```
Conn:1 Line:1 Timeslot:16          19 14:52:03.825
ENVELOPE FRAME: .....H.....
INFO : ....H.....
PROTOCOL PARAMETER
Protocol discriminator : 72 (48h)
L3addr : 500 (01F4h)
Sequence-number
- length : 1 (01h)
- value  : 0 (00h)
Recognition-time
- length : 2 (02h)
- register recall (timed loop open)
- duration type : 1 (01h)
Conn:1 Line:1 Timeslot:16          20 14:52:03.831
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16          21 14:52:07.456
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16          22 14:52:07.457
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16          23 14:52:07.459
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16          24 14:52:07.462
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16          25 14:52:08.628
ENVELOPE FRAME: .....
RECEIVER READY
```

AN

LE

```
Conn:1 Line:1 Timeslot:16          26 14:52:08.629
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16          27 14:52:08.630
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16          28 14:52:08.633
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16          29 14:52:08.829
ENVELOPE FRAME: .....H.....
INFO : ....H.....
SIGNAL ACK
Protocol discriminator : 72 (48h)
L3addr : 500 (01F4h)
Sequence-number
- length : 1 (01h)
- value  : 1 (01h)
Conn:1 Line:1 Timeslot:16          30 14:52:08.832
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16          31 14:52:08.934
ENVELOPE FRAME: .....H.....
INFO : ....H.....
SIGNAL
Protocol discriminator : 72 (48h)
L3addr : 500 (01F4h)
Sequence-number
- length : 1 (01h)
- value  : 0 (00h)
Steady-signal
- length : 1 (01h)
- on hook (loop open)
```

AN

LE

```
Conn:1 Line:1 Timeslot:16          32 14:52:08.936
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16          33 14:52:08.945
ENVELOPE FRAME: .....H...
INFO : ....H...
DISCONNECT
Protocol discriminator : 72 (48h)
L3addr : 500 (01F4h)
Conn:1 Line:1 Timeslot:16          34 14:52:08.948
ENVELOPE FRAME: .....H..#@...B...
INFO : ....H..#@...B...
DE-ALLOCATION
Protocol discriminator : 72 (48h)
BCC reference number
- LE created process
- value : 9 (0009h)
User port identification
- PSTN port application
- length : 2 (02h)
- length : 2 (02h)
- value : 500 (01F4h)
V5 time slot identification
- length : 2 (02h)
- link: 10 (0Ah)
- time slot: 2 (02h)
- override not requested
Conn:1 Line:1 Timeslot:16          35 14:52:08.952
ENVELOPE FRAME: .....
RECEIVER READY
Conn:1 Line:1 Timeslot:16          36 14:52:08.954
ENVELOPE FRAME: .....H...
INFO : ....H...
DISCONNECT COMPLETE
Protocol discriminator : 72 (48h)
L3addr : 500 (01F4h)
```

Continues ...16

AN

LE

```
Conn:1 Line:1 Timeslot:16          37 14:52:08.956
ENVELOPE FRAME: .....
RECEIVER READY

Conn:1 Line:1 Timeslot:16          38 14:52:08.961
ENVELOPE FRAME: .....
RECEIVER READY

Conn:1 Line:1 Timeslot:16          39 14:52:08.971
ENVELOPE FRAME: .....H..$
INFO : ....H..$
DE-ALLOCATION COMPLETE
Protocol discriminator : 72 (48h)
BCC reference number
- LE created process
- value : 9 (0009h)

Conn:1 Line:1 Timeslot:16          40 14:52:08.974
ENVELOPE FRAME: .....
RECEIVER READY

Conn:1 Line:1 Timeslot:16          41 14:52:11.980
ENVELOPE FRAME: .....%
RECEIVER READY

Conn:1 Line:1 Timeslot:16          42 14:52:11.980
ENVELOPE FRAME: ....$$H..00..
INFO : ..$$H..00..
LINK CONTROL : 48 00 0A 30 30 01 80
Conn:1 Line:1 Timeslot:16          43 14:52:12.000
ENVELOPE FRAME: .....%
RECEIVER READY

Conn:1 Line:1 Timeslot:16          44 14:52:12.014
ENVELOPE FRAME: .....&
RECEIVER READY
```

AN**LE**

Conn:1 Line:1 Timeslot:16 45 14:52:12.016
ENVELOPE FRAME:\$&H..10..
INFO : ..\$&H..10..
LINK CONTROL ACK : 48 00 0A 31 30 01 80
Conn:1 Line:1 Timeslot:16 46 14:52:12.001
ENVELOPE FRAME:&
RECEIVER READY
Conn:1 Line:1 Timeslot:16 47 14:52:14.498
ENVELOPE FRAME:&&H..00..
INFO : ..&&H..00..
LINK CONTROL : 48 00 0A 30 30 01 83
Conn:1 Line:1 Timeslot:16 48 14:52:14.501
ENVELOPE FRAME:(
RECEIVER READY
Conn:1 Line:1 Timeslot:16 49 14:52:14.503
ENVELOPE FRAME:&(H..10..
INFO : ..&(H..10..
LINK CONTROL ACK : 48 00 0A 31 30 01 83
Conn:1 Line:1 Timeslot:16 50 14:52:14.508
ENVELOPE FRAME:(
RECEIVER READY
Conn:1 Line:1 Timeslot:16 51 14:52:17.465
ENVELOPE FRAME:
RECEIVER READY
Conn:1 Line:1 Timeslot:16 52 14:52:17.467
ENVELOPE FRAME:
RECEIVER READY
Conn:1 Line:1 Timeslot:16 53 14:52:18.636
ENVELOPE FRAME:
RECEIVER READY
Conn:1 Line:1 Timeslot:16 54 14:52:18.639
ENVELOPE FRAME:
RECEIVER READY
Conn:1 Line:1 Timeslot:16 55 14:52:18.961
ENVELOPE FRAME:
RECEIVER READY
Conn:1 Line:1 Timeslot:16 56 14:52:18.966
ENVELOPE FRAME:
RECEIVER READY
Conn:1 Line:1 Timeslot:16 57 14:52:18.977
ENVELOPE FRAME:
RECEIVER READY

End
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