beyerdynamic

Interface Protocol

DCU
<–>
Ext. Controller

via RS232

Version 2.7

20.09.2002/ 6.4.2006

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24.4.2010
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Content

Revision:

Version 2.7:

- The former dummy Byte 6 is now used for activating or deactivating a NOM check (only if Byte 6 has the value 1 the NOM check is activated. For all other values no NOM check is made (that was the former behaviour))
- New Message NOM Exceeded if the NOM check is activated and the NOM limit is reached
- New for SwitchDelegate command: all requests off

Version 2.6:

- Comment for SwitchDelegate added (all mics off)

Version 2.5:

- directory structure of content improved

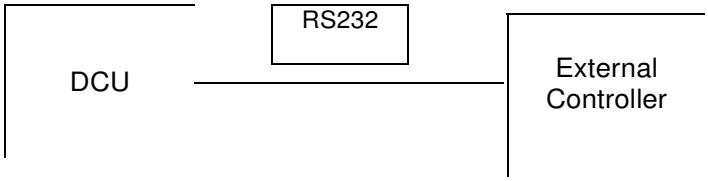
Version 2.4:

- typing correction: the GetVolume command 0x0D has length 1 and not 3

1 General

You may connect one single External Controller device to a DCU. For this, the External Controller Option must be enabled. iCNS works in parallel.

2 Schema DCU – Media Control System



3 Connection requirements for the External Controller and the DCU

- DCU Option External Controller Module
- External Controller with RS232

4 Communication Interface Parameters

Recommended:

- Baud: 115200
- Parity: even
- Data: 8
- Stop: 1
- RTS-CTS handshake: on

5 DCU Settings

Set the communication parameters of a DCU Com Port:

- Power on
- Press “SETUP”
- Select “Options” (use up and down arrow keys)
- Press “ENTER”
- Select “Ports” (use up and down arrow keys)
- Press “ENTER”
- Select appropriate interface (COM1 or COM2, use up and down arrow keys)
- Select “Extern Cont” (use left and right arrow keys)
- Press “EXIT”

The parameters are saved in the DCU.

6 Tranferprotocol for control commands from Ext. Controller to DCU

6.1 General Description

- All code statements in C notation (0x0C -> hex, 12 -> dec)

- 1. byte is packet length

- % stands for: DO NOT CARE

- *Constant values are marked blue italic*

- Each Delegate Station has a double identification: (byte) GroupID and (word) logID. Lo(logID) is the low byte of the logID and Hi(logID) is the high byte of the logID

- The SessionID is “1” in the Standard mode. In the MultiSession mode, the range of the SessionID is “1 ..50”, depending on the iCNS settings.

Example: Set Session Mode and Limits

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10
Len = 9	*CMD = 0x0C*	Mode Selector	REQU Limit	Free Limit	AUTO Free Limit	AUTO Requ Limit	VOICE Limit	FIFO Limit	Session ID

7 Commands (DCU -> Ext. Controller)

7.1 Session parameters

7.1.1 Session Mode

The Session Mode is sent to an External Controller when the setting of the DCU has been changed.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10
Len = 9	*CMD = 0x0C*	Session ID	Mode Selector	REQU Limit	Free Limit	AUTO Free Limit	AUTO Requ Limit	FIFO Limit	VOICE Limit

Limit range: 0..16

Mode Selector (Byte 4): [Valid for DCU without Voice Option]

Value	Mode
0	REQU
1	FREE
2	AUTO
4	FIFO

Mode Selector (Byte 4): [Valid for DCU with Voice Option]

Value	Mode
0	REQU
1	FREE
2	AUTO
4	FIFO
5	VOICE

Remark:
Mode = 3 doesn't exist.

7.2 Speakerlist (Delegate stations on/off/requ)

The speakerlist is sent to the Ext. Controller when a microphone is turned on or off.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
Len = 8	*CMD = 0x0B*	Session ID	Flag	Lo(logID)	Hi(logID)	Pos	State	Group ID

State:

Value	State
1	ON
2	REQU

Flag: (used for screen synchronisiation)

Value	Flag
0	First Position
1	Loop
2	Last Position

remarks Byte 5 and 6:
- if logID = 0, delete List Position

remarks Byte 7:
- Position in Speakerlist

Hints:

To indicate that a new speakerlist is sent to the external controller the first command starts with Flag = 0.
Afterwards all delegate IDs which have an open microphone or which are in request mode are sent in single commands (within a loop) with Flag = 1.
The command with Flag = 2 indicates that the transfer of the speakerlist has been finished.

Here's an example:

Delegate ID 1-11 was on and then Delegate ID 1-2 is turned on (ID 0-0 should be ignored):

07.12.2009 14:36:31 [RX] - 07 6A 01 01 02 00 01 00
Key pressed: Session: 1, ID: 1-2, Keycode: 1 (dmcMICKey)

07.12.2009 14:36:31 [RX] - 03 0B 01 00
--- Speakerlist - Start: Session: 1

07.12.2009 14:36:31 [RX] - 08 0B 01 01 0B 00 00 01 01
Speakerlist - Loop: ID: 1-11, Position: 0, State: on

07.12.2009 14:36:31 [RX] - 08 0B 01 01 02 00 01 01 01
Speakerlist - Loop: ID: 1-2, Position: 1, State: on

07.12.2009 14:36:31 [RX] - 07 0B 01 01 00 00 02 00
Speakerlist - Loop: ID: 0-0, Position: 2, State: 0

07.12.2009 14:36:32 [RX] - 03 0B 01 02
--- Speakerlist - Stop: Session: 1

7.3 Volume

When the Volume of the DCU is changed the following command will be sent to the Ext. Controller:

Byte 1	Byte 2	Byte 3	Byte 4
Len = 3	*CMD = 0x0D*	Session ID	Volume

Volume:

Value	dB
0	max. volume 0.0 dB
63	min. volume -94.5 dB

Volume is a value between 0 and 63. One step changes the value by -1.5 dB.
0 is the maximum volume 0.0 dB and 63 is the minimum volume -94.5 dB.

7.4 Key Pressed

When a key of a terminal station is pressed (Microphone key, keys 0-9, Prior, Cancel) this is reported to an external Controller. The terminal station might be a delegate station or a president station.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Len = 7	*CMD = 0x6A*	Session ID	groupID	Lo(logID)	Hi(logID)	Lo(Keycode)	Hi(Keycode)

Keycodes:

Keycode	Key
0x01	MIC Key
0x02	Key 1
0x03	Key 2
0x04	Key 3
0x05	Key 4
0x06	Key 5
0x07	Key 6
0x08	Key 7
0x09	Key 8
0x0a	Key 9
0x0b	Key 0
0x14	Priority Key
0x16	Cancel Key

Remarks:

Revoluto stations have a maximum of 5 keys (Key 1 – Key 5) or less.

Key 5 of a Revoluto terminal station (Delegate / President station) is used to display the ID and is not reported to the DCU and therefore cannot be reported to an external controller.

Key 1 and Key 2 of a President station are used for the Previous/Next functionality. Also Key 9 and Key 0 are used for the Previous/Next functionality.

7.5 President SoftKey pressed

When a SoftKey (only key 0 – 9) of a President station is pressed this is reported to an External Controller.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Len = 7	*CMD = 0x5E*	Session ID	groupID	Lo(logID)	Hi(logID)	Lo(SoftKeycode)	Hi(SoftKeycode)

SoftKeycodes:

SoftKeycode	SoftKey
0x02	Key 1
0x03	Key 2
0x04	Key 3
0x05	Key 4
0x06	Key 5
0x07	Key 6
0x08	Key 7
0x09	Key 8
0x0a	Key 9
0x0b	Key 0

Remarks:
Revoluto stations have a maximum of 5 keys (Key 1 – Key 5) or less.

This command was originally only for Key 4 planned: When Key 4 of a president station was pressed an External Controller should e.g. turn on or turn off external loudspeakers (mute functionality).
(Key 1 and Key 2 should not be used for that because they are used as Previous/Next Buttons. Key 5 of a Revoluto station is already used to display the ID and is not reported to the DCU and therefore also not to the external controller. Key 1, Key 2 and Key 3 are used by iCNS for voting: Yes/No/Abstain. Also Key 9 and Key 0 (if the terminal has 10 keys) are reserved for Previous/Next.)

Hint:
When the Mic key, Priority key or Cancel key of a president station is pressed this is only reported to an External Controller via the “Key Pressed” command.
Also all other Softkeys (Key 0 – 9) are reported via the “Key Pressed” command.

7.6 Interpreter Mic key

When the microphone key of an interpreter station is pressed a message is send to an external Controller.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Len = 0x10	*CMD = 0x40*	Change state	Session ID	Mic state	Lo(phyID)	Hi(phyID)	groupID

Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17
Lo(logID)	Hi(logID)	Language char 1	Language char 2	Language char 3	Lo(chID)	Hi(chID)	Lo(InUse)	Hi(InUse)

ChangeState:

Value	ChangeState
1	Change occured

Mic state (Microphone state):

Value	Microphone State
0	OFF
1	ON

phyID:
The phyID should not be used. Use logID instead.
(The phyID changes every time the DCU is turned on. It is used internally and not intended for the user.)

Language char 1-3:
Language char 1-3 contain the ASCII-Codes for the language which the interpreter is using (the channel name).
E.g. if the language characters 1-3 contain the ASCII values “65 6E 67“ the interpreter is speaking on the “eng” channel.

chID (Channel ID):
The channel ID that is used by the interpreter.

InUse:

Value	InUse
0	Channel is used
1	Channel is not in use

7.7 Interpreter chipcard

If a valid chipcard is inserted in an interpreter station a message is sent to the external Controller.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7-13
Len = 0x0C	*CMD = 0x16*	Group ID	Lo(LogID)	Hi(LogID)	State	Chipcard ID 1-7 (low Byte first)

ChipcardState:

Value	InUse
0	Interpreter Chipcard removed
7	Interpreter Chipcard accepted

Chipcard ID 1-7:
7 Bytes are used for the chipcard ID. Least significant byte comes first.

Remarks:
The chipcard of an interpreter station is used to store some settings of the interpreter station.

If a chipcard is inserted in a delegate station no message is sent. The chipcard for the delegate stations can only be used in iCNS.

7.8 DCU Ping Reply

Requirements:
DCU V00.70u

If the external controller has sent a DCU Ping command (0x6C) (e.g. for testing if the DCU is still available), the connected DCU replies with the following command:

Byte 1	Byte 2	Byte 3	Byte 4
Len = 0x03	*CMD = 0x6C*	Lo(DCUID)	Hi(DCUID)

7.9 NOM Limit Exceeded Message

Requirements:
DCU V00.71b

If the External Controller has sent a Switch Delegate command with an activated NOM Check then a NOM Limit Exceeded Message will be sent from the DCU to the External Controller if the NOM limit (Number of Open Microphones) is exceeded.

In this case the microphone of the delegate station cannot be switched on and therefore no Speakerlist will be sent. The NOM Limit Exceeded Message will be sent instead and contain the ID of the device which couldn't be switched on (or switched into request mode).

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
Len = 5	*CMD = 0x6D*	Session ID	groupID	Lo(logID)	Hi(logID)

8 Commands (Ext. Controller -> DCU)

8.1 Session parameters

8.1.1 Set Session Mode and Limits

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10
Len = 9	*CMD = 0x0C*	Mode Selector	REQU Limit	Free Limit	AUTO Free Limit	AUTO Requ Limit	VOICE Limit	FIFO Limit	Session ID

Limit range: 0..16

Mode Selector (Byte 3): [Valid for DCU without Voice Option]

Value	Mode
0	REQU
1	FREE
2	AUTO
4	FIFO

Mode Selector (Byte 3): [Valid for DCU with Voice Option]

Value	Mode
0	REQU
1	FREE
2	AUTO
4	VOICE
5	FIFO

Remarks:

- The „Set Session Mode“ command has not the same order of the fields as the “Session Mode” command that is sent by the DCU when the Session Mode has been changed at the DCU
- Mode = 3 doesn’t exist
- SessionID is 1 for the Standalone DCU mode (without iCNS)

8.2 Switch Delegate stations on/off/requ

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Len = 6	*CMD = 0x0A*	Lo(logID)	Hi(logID)	State	Use NOM Check	Group ID

State:

Value	State
1	ON
2	OFF
3	REQU

Use NOM Check (new since DCU V00.71 b, before it was a dummy byte):

Value	Use NOM Check
Not 1	No NOM Check is made by the DCU (e.g. value 0 or 0xFF)
1	A NOM Check is made by the DCU

Use NOM Check (Byte 6):

The former dummy Byte 6 is now used for deciding if a NOM (Number of Open Microphones) check is made by the DCU or no NOM check is made.
If Byte 6 (Use NOM Check) has the value 1 the DCU will perform a NOM check when receiving the Switch Delegate command. If the NOM limit is already reached then the Switch command will not be executed and NOM Limit Exceeded Message (0x6D) will be send to the External Controller that the NOM limit was already reached.
If Byte 6 (Use NOM Check) has a value different than 1 (e.g. 0 or 255) no NOM check is made by the DCU.
The behaviour before DCU Version 00.71 b was that no NOM check was made by the DCU. The Byte 6 (at that time a dummy Byte) should have had the value 0 or any value except 1. So no change in the behaviour of old programs should occur with the new usage of Byte 6.

Remarks:

Switch All Mics Off

LogID must be 0, State must be 0
(GroupID = 1 if DCU is in standalone mode, i.e. without iCNS)

If Lo(ID) * 0xFF + Hi(ID) + State == 0 -> Switch **ALL** mics off
(GroupID = 1 if DCU is in standalone mode, i.e. without iCNS)

Lo(logID) = 0
Hi(LogID) = 0
State = 0
GroupID = 1

New in DCU Version V00.71 a:

Switch All Requests Off

LogID must be 0, State must be 1.
(GroupID = 1 if DCU is in standalone mode, i.e. without iCNS)

Lo(logID) = 0
Hi(LogID) = 0
State = 1
GroupID = 1

8.3 Set Volume

To set the volume of the DCU the following command has to be sent by the External Controller:

Byte 1	Byte 2	Byte 3	Byte 4
Len = 3	*CMD = 0x0D*	Volume	Session ID

Volume:

Value	dB
0	max. volume 0.0 dB
63	min. volume -94.5 dB

Volume is a value between 0 and 63. One step changes the value by -1.5 dB.
0 is the maximum volume 0.0 dB and 63 is the minimum volume -94.5 dB.

Remarks:

- if the DCU is in standalone mode (without iCNS) the Session ID is 1
- After the “Set Volume” command has been sent the DCU returns the new volume to the External Controller as acknowledge. The difference between the “Set Volume” command of the External Controller and the returned answer of the DCU is that bytes 3 and 4 are swapped.

E.g.:

The following External Controller command changes the DCU Volume to -94.5 dB (Session ID is 1, volume is 63):

03 0D 3F 01

The DCU answers with:

03 0D 01 3F

In the DCU answer the bytes 3 and 4 are swapped in comparison with the original command of the External Controller.

8.4 Get Volume

To get the current volume of the DCU the following command has to be sent by the External Controller:

Byte 1	Byte 2
Len = 1	*CMD = 0x0D*

The DCU replies with the current volume:

Byte 1	Byte 2	Byte 3	Byte 4
Len = 3	*CMD = 0x0D*	Session ID	Volume

Volume:

Value	dB
0	max. volume 0.0 dB
63	min. volume -94.5 dB

Volume is a value between 0 and 63. One step changes the value by -1.5 dB.
0 is the maximum volume 0.0 dB and 63 is the minimum volume -94.5 dB.

8.5 Set President SoftKeyLED

When the user configurable key 4 of a president terminal is pressed (and signalled to an external controller: see command “President Softkey pressed”) it is possible to send a command to the DCU to turn on the according LED 4.
This might be useful when e.g. key 4 of the president terminal is used to mute external loudspeakers. Then LED 4 can be used to show if the loudspeakers are turned on or off.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
Len = 8	*CMD = 0x5F*	Session ID	groupID	Lo(logID)	Hi(logID)	Lo(LEDcode)	Hi(LEDcode)	LED state

LED code:

LED code	LED
0x0002	LED 1
0x0004	LED 2
0x0008	LED 3
0x0010	LED 4
0x0020	LED 5
0x0040	LED 6
0x0080	LED 7
0x0100	LED 8
0x0200	LED 9
0x0400	LED 0

LED state:

LED state	LED
0	Off
1	On
2	Blinking*

Remarks:
Only LED 0 – 9 can be turned on or off.

Only Key 4 and the according LED4 should be used for user configurable tasks.
Key 1 and Key 2 should not be used for that because they are used as Previous/Next Buttons.
Key 5 is already used to display the ID. Key 1, Key 2 and Key 3 are used by iCNS for voting: Yes/No/Abstain. Also Key 9 and Key 0 (if the terminal has 10 keys) are reserved for Previous/Next.

* DCU version **V00.70 s** or newer is necessary for blinking of the president LED4

8.6 Set Delegate KeyLED

It is possible to turn the LED of a terminal station (and also president terminal) on or off (analogue to the President KeyLED).

When the user configurable key 4 of a terminal is pressed (and signalled to an external controller: see command “Key pressed”) it is possible to send a command to the DCU to turn on the according LED 4.
This might be useful when e.g. key 4 of the terminal is used for special purposes.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
Len = 8	*CMD = 0x6B*	Session ID	groupID	Lo(logID)	Hi(logID)	Lo(LEDcode)	Hi(LEDcode)	LED state

LED code:

LED code	LED
0x0002	LED 1
0x0004	LED 2
0x0008	LED 3
0x0010	LED 4
0x0020	LED 5
0x0040	LED 6
0x0080	LED 7
0x0100	LED 8
0x0200	LED 9
0x0400	LED 0

LED state:

LED state	LED
0	Off
1	On
2	Blinking*

Remarks:
Only LED 0 – 9 can be turned on or off.

Only Key 4 and the according LED4 should be used for user configurable tasks.
Key 1 and Key 2 should not be used for that because they are used as Previous/Next Buttons in president terminals. Key 5 is already used to display the ID. Key 1, Key 2 and Key 3 are used by iCNS for voting: Yes/No/Abstain. Also Key 9 and Key 0 (if the terminal has 10 keys) are reserved for Previous/Next for president terminals.

* DCU version **V00.70 s** or newer is necessary for blinking of the LED

8.7 Send DCU Ping

Requirements:
DCU V00.70u

The external controller can send a DCU Ping command which causes the connected DCU to reply (command DCU Ping Reply 0x6C). An external controller can use this command to check if the connected DCU is available.

Byte 1	Byte 2
Len = 1	*CMD =0x6C*

9 Simulation Tool DCUComm

There is a tool DCUComm which can simulate an External Controller (Media Control System). All commands that can be sent by an External Controller can also be sent by this tool. The precise command structure can be displayed. Also all commands that are sent by the DCU can be viewed in detail. With this tool the complete protocol can be viewed and all available commands can be tried out. It might be useful for testing and implementing the protocol in an External Controller.