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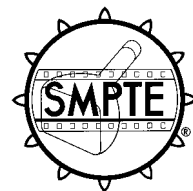
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SMPTE RECOMMENDED PRACTICE

Routing Switcher Type-Specific Messages for Remote Control of Broadcast Equipment



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Introduction

This clause contains a general explanation of some of the concepts used in the formulation of the routing switcher type-specific message set. It constitutes tutorial information and is intended to assist in the understanding of the specifications in clause 6 of this practice. A working knowledge of the following EBus topics is assumed:

- EBus system overview;
- control message architecture;
- supervisory protocol;
- tributary interconnection;
- electrical and mechanical characteristics;
- system service and common messages.

Conventions: Acronyms and abbreviations are shown in uppercase characters; e.g., information field – I/F.

Message keywords and names of information fields are shown in uppercase characters; e.g., CONNECT CROSSPOINT; SOURCE POINTER.

These command keywords and information field names are used within the text of this practice to imply requested action, information field identity, and, in turn, the information field contents of the virtual machine. To assist in readability of this practice, these terms are used in the context of the presentation material; e.g., “If this I/F is PRESET, ...” (PRESET in this context refers to a command contained within the type-specific message set.)

Terms with special meaning to this or related documents are shown with leading uppercase characters; e.g., Virtual Machine; Common Messages.

1 Scope of the dialect

This dialect is intended to be used for the external control of routing switcher systems.

2 Multidimensional information fields

The controlled elements in a routing switcher are in the crosspoints. The crosspoints are arranged in a multidimensional way; i.e., to identify an individual crosspoint, it is usually necessary to specify the following characteristics of its location:

- its row (1.dimension);
- its column (2.dimension);
- its level (3.dimension);
- its matrix (4.dimension).

(The latter applies only to a switcher consisting of several matrices.)

In EBus dialects, all kinds of status data are maintained in Information Fields (I/Fs). Each type of information has its corresponding I/F associated with a unique I/F Name. In routing switcher systems, nearly all status data are related to crosspoints. Because crosspoints are arranged in a multidimensional way, and each crosspoint is the carrier of status data, the I/Fs describing routing switcher data must also be multidimensional. The particular item of information belonging to one crosspoint is just an element of the whole Information Field of a certain type. This requires additional descriptors which point to the location of this element within the field; i.e., to the row, column, level, and matrix.

When such an element of an I/F is tallied, these descriptors are simply carried as parameters in the format. When such an element is accessed, however,

a different mechanism is required due to the fact that the Common commands which access I/Fs (e.g., READ, UPDATE, CYCLE) allow only for specifying the I/F name. No additional descriptor information is permitted in the format. Such additional information must, therefore, be transmitted in advance by pre-setting one or more pointers which predefine the parameters necessary for multidimensional access.

The pointers themselves also reside in Information Fields of their own and thus can be PRESET as any other presettable I/F. This gives the advantage that the pointer information need only be transmitted when it really changes, not in advance of every I/F access.

The names of the relevant pointers are:

- MATRIX POINTER;
- LEVEL POINTER;
- SOURCE POINTER;
- DESTINATION POINTER.

NOTE – In order to PRESET a multidimensional I/F, no pointers are required since the whole format of an I/F appears within the PRESET command, including the descriptors

Because of the special requirements of routing switchers, one of these dimensions may not be specified; e.g., the I/F DESTINATIONS-TO-SOURCE does not use the DESTINATION POINTER because it shows all connections between a specified source and any destination in the form of a list.

3 Wildcard characters

In order to facilitate access to a whole array (row, column, level, matrix), of one type of a multidimensional status information, a wildcard character is introduced (FF_h to FFFF_h, respectively).

A pointer, preset to the wildcard, indicates (when an I/F access requiring this pointer is made) that the information corresponding to a full available range of the pointer is desired. For example, if the LEVEL POINTER is preset to FF_h, a subsequent READ of the I/F CROSSPOINT STATUS will result in a multiple I/F RESPONSE message (either in many single messages or in one message using the BEGIN/END construct or in combination) tallying the crosspoint status of all existing levels.

A second application of the wildcard concerns certain commands (e.g., CONNECT CROSSPOINT), where it can be used as a normal parameter with the same effect.

The description of the commands and information fields in clause 6 contains detailed instructions as to when and how wildcards can be used.

4 Procedures and events

As with all Dialects, the complete Routing Switcher Dialect, by definition, consists of both Common Messages and the Routing Switcher Type-Specific Dialect described in this practice.

The elements of the Common Messages prove very useful for switcher applications and are, therefore, recommended. The concept of Procedures provided by the common messages can be used to predefine a lengthy set of commands (by the DEFINE PROCEDURE command) pending the arrival of the EXECUTIVE PROCEDURE command, which causes the entire Procedure to be performed.

The concept of Events provided by the Common Messages can be used to predefine a command (by the DEFINE EVENT command) to be executed at a certain point in time. As the time scale (usually the Timeline) is used, an individual software clock running in each controlled Virtual Machine is preset by the bus controller (by the System Service command REQUEST TIME TRANSMISSION).

Both concepts can easily be combined by first defining a procedure, then defining an event with EXECUTE PROCEDURE as the command to be carried out on the timeline.

Details about these facilities are described in the documents about System Service and Common Messages mentioned above.

5 Sample command sequences

The following message sequences show the application of the dialect (including the Common Messages). The commands are also shown encoded into their hexadecimal codes.

The PRESET commands signed with a "*" sign may be omitted if the corresponding I/F has already been preset by a preceding PRESET command.

5.1 Disconnecting all crosspoints in level #10 matrix #2:

<DISCONNECT CROSSPOINT>		<43>
<MATRIX = 2>		<02>
<LEVEL = 10>		<0A>
<SOURCE = wildcard>		<FFFF>
<DESTINATION = wildcard>		<FFFF>

5.2 Requesting the status of all crosspoints in level #2 of matrix #1:

<PRESET>	*	<60>
<MATRIX POINTER>		<41>
<MATRIX = 1>		<01>
<PRESET>	*	<60>
<LEVEL POINTER>		<42>
<LEVEL = 2>		<02>
<PRESET>	*	<60>
<SOURCE POINTER>		<43>
<SOURCE = wildcard>		<FFFF>
<READ>		<22>
<DESTINATIONS-TO-SOURCE>		<46>

The response from the controlled virtual machine may be:

<I/F ITEM RESPONSE>		<23>
<BEGIN>		<01>
<DESTINATION-TO-SOURCE>		<46>
<MATRIX = 1>		<01>
<LEVEL = 2>		<02>
<SOURCE = 0>		<0000>
<PARAMETER COUNT = 1> (one connection)		<0001>
<DESTINATION = 3>		<0003>
<DESTINATION-TO-SOURCE>		<46>
<MATRIX = 1>		<01>
<LEVEL = 2>		<02>
<SOURCE = 1>		<0001>
<PARAMETER COUNT = 0> (no connection)		<0000>
<DESTINATION-TO-SOURCE>		<46>
<MATRIX = 1>		<01>
<LEVEL = 2>		<02>
<SOURCE = 2>		<0002>
<PARAMETER COUNT = 4> (multiple connection)		<0004>
<DESTINATION = 2>		<0002>
<DESTINATION = 4>		<0004>
<DESTINATION = 9>		<0009>
<DESTINATION = 17>		<0011>
<DESTINATION-TO-SOURCE>		<46>
<MATRIX = 1>		<01>
<LEVEL = 2>		<02>
<SOURCE = 31>		<001F>
<PARAMETER COUNT = 1>		<0001>
<DESTINATION = 1>		<0001>
<DESTINATION = 4>		<0004>
<DESTINATION = 9>		<0009>
<DESTINATION = 17>		<0011>

5.3 Instructing the controlled Virtual Machine to tally any changes in the crosspoint status of matrix #3:

<PRESET>	*	<60>
<MATRIX POINTER>		<41>
<MATRIX = 3>		<03>

<PRESET>	*	<60>
<LEVEL POINTER>		<42>
<LEVEL = wildcard>		<FF>
<PRESET>	*	<60>
<DESTINATION POINTER>		<44>
<DESTINATION = wildcard>		<FFFF>
<UPDATE>		<3F07>
<SOURCES-TO-DESTINATION>		<47>

On a change, the response from the controlled Virtual Machine may be:

<I/F ITEM RESPONSE>	<23>
<SOURCES-TO-DESTINATION>	<47>
<MATRIX = 3>	<03>
<LEVEL = 2>	<02>
<DESTINATION = 9>	<0009>
<PARAMETER COUNT = 1>	<0001>
<SOURCE = 11>	<000B>

5.4 Defining a procedure that establishes a default configuration of connections:

<DEFINE PROCEDURE>	<3F0B>
<NAME = 1>	<01>
<BYTE COUNT = XX>	<00XX>
<CONNECT CROSSPOINT>	<42>
<MATRIX = 1>	<01>
<LEVEL = 1>	<01>
<SOURCE = 0>	<0000>
<DESTINATION = 12>	<000C>
<CONNECT CROSSPOINT>	<42>
<MATRIX = 1>	<01>
<LEVEL = 1>	<01>
<SOURCE = 1>	<0001>
<DESTINATION = 10>	<000A>
<CONNECT CROSSPOINT>	<42>
<MATRIX = 1>	<01>
<LEVEL = 1>	<01>
<SOURCE = 2>	<0002>
<DESTINATION = 2>	<0002>
<CONNECT CROSSPOINT>	<42>
<MATRIX = 1>	<01>
<LEVEL = 1>	<01>
<SOURCE = 3>	<0003>
<DESTINATION = 7>	<0007>
...	

Once defined, the procedures may be carried out as often as desirable simply by commanding:

<EXECUTE PROCEDURE>	<26>
<NAME = 1>	<01>

5.5 Setting a crosspoint at 9:00 o'clock on the timeline:

<DEFINE EVENT>	<27>
<NAME = 3>	<03>
<I/F NAME OF TRIGGER SOURCE = TIMELINE>	<24>
<TRIGGER VALUE = 09:00:00:00>	<09000000>
<CONNECT CROSSPOINT>	<42>
<MATRIX = 1>	<01>
<LEVEL = 1>	<01>
<SOURCE = 3>	<0003>
<DESTINATION = 7>	<0007>

6 Routing switcher type-specific messages

Virtual machine type is 05_h.

GENERAL NOTES

- 1 All parameters described below as 1-byte numbers or 2-byte numbers are binary-coded unsigned numbers.
- 2 Parameters which can be used with Wildcard Characters are indicated below by FF_h = all or FFFF_h = all, respectively.
- 3 In all cases, the temporal order or EVENTS must be preserved. Mutually exclusive commands actuated by the EVENT construct, which are placed on the EVENT cue at the same trigger point, will cause both events to cancel.

6.1 Index

Numerical Index of Keywords, Information Field Names, and Mnemonics

	MESSAGE KEYWORDS	MNEMONIC	I/F FIELD NAMES	MNEMONIC
40	Not used		40 COMMAND ERROR STATUS	CEST
41	Not used		41 MATRIX POINTER	MPOI
42	CONNECT CROSSPOINT	CONC	42 LEVEL POINTER	LPOI
43	DISCONNECT CROSSPOINT	DISC	43 SOURCE POINTER	SPOI
44	LOCK CROSSPOINT	LCKC	44 DESTINATION POINTER	DPOI
45	UNLOCK CROSSPOINT	UNLC	45 Not used	
46	SPECIFIC MUTE	SPMT	46 DESTINATION-TO-SOURCE	DTOS
47	Not used		47 SOURCES-TO-DESTINATION	STOD
48	TEST CROSSPOINTS	TESC	48 CROSSPOINT STATUS	CSTA
49	Not used		49 SRC SIGNAL STATUS	SSTA
4A	SET CROSSPOINT EXCLUSION	SCEX	4A LEVEL CONFIGURATION	LECO
4B	CLEAR CROSSPOINT EXCLUSION	CCEX	4B LEVEL STATUS-MISSING BLOCKS	LSMB
4C	Not used		4C LEVEL STATUS-ADDED BLOCKS	LSAB
4D	Not used		4D Not used	
4E	Not used		4E SOURCE NAME	SNAM
4F	Not used		4F DESTINATION NAMES	DNAM
50	Not used		50 LOCKED DEST-TO-SOURCE	LDTS
51	Not used		51 LOCKED SOURCES-TO-DEST	LSTD
52	Not used		52 EXCLUSION DEST-TO-SOURCE	EXDS
53	Not used		53 EXCLUSION SOURCES-TO-DEST	EXSD
54	Not used		54 Not used	
55	Not used		55 Not used	
56	Not used		56 Not used	
57	Not used		57 Not used	
58	CHOP	CHOP	58 DESTINATIONS-IN-CHOP	DICH
59	Not used		59 CHOP SOURCE	CSRC
5A	SET CHOP RATE	SCHR	5A CHOP RATE STATUS	CHRS
5B	SET CHOP TIME	SCHT	5B CHOP TIME STATUS	CHTS
5C	Not used		5C Not used	
5D	Not used		5D Not used	
5E	Not used		5E Not used	
5F	Not used		5F Not used	
60	PRESET	PRST	60 Not used	