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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS
Infrastructure of audiovisual services – Systems aspects

**Frame-synchronous control and indication
signals for audiovisual systems**

ITU-T Recommendation H.230
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(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION H.230

FRAME-SYNCHRONOUS CONTROL AND INDICATION SIGNALS FOR AUDIOVISUAL SYSTEMS

Summary

Digital audiovisual services are provided by a transmission system in which the relevant signals are multiplexed onto a digital path using the frame structure defined in Recommendation H.221. In addition to the audio, video, user data and telematic information, these signals include information for the proper functioning of the system. The additional information has been named Control and Indication (C&I) to reflect the fact that while some bits are genuinely for "control", causing a state change somewhere else in the system, others provide for indications to the users as to the functioning of the system. This Recommendation concerns only those C&I which must be transmission frame-synchronous, or otherwise requiring rapid response.

The Recommendation details the C&I related to video and audio; means of transmitting Numbers and Characters; C&I for maintenance purposes; for simple multipoint conferences not using protocol in the MLP channel; for channel aggregation; and for the transfer of network addresses. The codepoint tables also indicate the circumstances under which the various functions may be mandatory or optional.

Source

ITU-T Recommendation H.230 was revised by ITU-T Study Group 16 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 10th of July 1997.

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FOREWORD

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The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation H.230

FRAME-SYNCHRONOUS CONTROL AND INDICATION SIGNALS FOR AUDIOVISUAL SYSTEMS

(Geneva, 1990; revised in 1993, 1995 and 1997)

1 Scope

Digital audiovisual services are provided by a transmission system in which the relevant signals are multiplexed onto a digital path. In addition to the audio, video, user data and telematic information, these signals include information for the proper functioning of the system. The additional information has been named Control and Indication (C&I) to reflect the fact that while some bits are genuinely for "control", causing a state change somewhere else in the system, others provide for indications to the users as to the functioning of the system.

The C&I may be categorized into three groups:

- a) call control – these are treated in the Q-Series Recommendations;
- b) transmission frame-synchronous, or otherwise requiring rapid response;
- c) conference, data, and telematic control not requiring frame synchronism, governed by the multilayer protocol of Recommendations T.122-125.

This Recommendation concerns only those C&I coming in category b) which includes a simplified set of conference C&I for multipoint connections of simple terminals.

2 Procedures

There are two procedures: some frame-synchronous C&I are provided directly as Bit-rate Allocation Signal (BAS) codes in Recommendation H.221, while the remainder require the use of an escape code.

2.1 C&I codes provided in Recommendation H.221

The following codes, whose functions are defined in clause 3, are provided in Recommendation H.221:

- VCF, VCU (procedures for use in multipoint calls according to Recommendation H.243);
- LCV, LCD, LCA, LCO (for maintenance).

In each case the code is transmitted in the BAS position at an appropriate time.

2.2 Other C&I codes

All frame-synchronous C&I codes not listed in 2.1 are transmitted by a sequence involving the BAS positions in two or more consecutive sub-multiframes. The full definitions of these symbols are set out in clause 3, assigning to each an alphabetic code-name; the first letter of this indicates the type; the second is C for command, I for indication; the third is for the specific function.

Codepoint values are listed in Tables 1 and 2. For convenience, the occupancy of Table 1 is shown in Table 4.

2.2.1 SBE method

The single-byte extension method involves two consecutive BAS codes. In the first, the code (111) [10001] is transmitted. In the second, the code defined in Table 1 is transmitted.

It should be noted that only one symbol is transmitted by this method – the code in the subsequent sub-multiframe is again treated as a normal BAS code.

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2.2.2 Double and triple SBE symbols

A "double symbol" consists of two SBE code-pairs, the second immediately following the first. The first is one of the symbols listed as having an associated SBE number or SBE character parameter to be conveyed by the second. Thus, a double symbol occupies four successive BAS positions, and takes 80 ms to transmit.

A "triple symbol" similarly consists of three SBE code-pairs in succession; the first is one of the symbols listed as having an associated numerical or character parameter to be conveyed by the second and third. Thus, a triple symbol occupies six successive BAS positions, and takes 120 ms to transmit.

A "quadruple symbol" consists of four SBE code-pairs in succession, occupies eight successive BAS positions, and takes 160 ms to transmit.

In the case of TII*, it may be double or triple, or longer, but the succession of symbols shall end with the symbol TIS.

2.2.3 MBE method

The multiple-byte extension method involves three or more consecutive BAS codes, in the following format:

$$\{\text{Start_MBE}\} / N / \langle x \rangle / (N-1) \text{ bytes}$$

where:

{Start_MBE} is specified in Table A.1/H.221;

N is a binary number in the range 1-223;

<x> is a value from Table 2.

3 Definitions of C&I symbols

3.1 C&I related to video

3.1.1 video indicate suppressed (VIS): This symbol is used to indicate that the content of the video channel does not represent a normal camera image. The video encoder may be without video input or an electronically-generated pattern may have been substituted.

3.1.2 video indicate active (VIA): Complementary to VIS. The video source is the only one, or, in the case that more video sources are to be distinguished, it is that designated "video No. 1".

3.1.3 VIA2: Equivalent to VIA, but designating "video No. 2" as the source.

3.1.4 VIA3: Equivalent to VIA, but designating "video No. 3" as the source.

3.1.5 video indicate ready-to-activate (VIR): This symbol is transmitted by a terminal whose user has decided not to send video unless he will also receive video from the other end.

3.1.6 video command "freeze picture request" (VCF): This symbol may be transmitted prior to the "video-off" mode switch, to prepare the video decoder for this event (see Note). This symbol is also transmitted by a Multipoint Control Unit (MCU) prior to video switching. On receipt, a terminal video decoder should complete updating of the current video frame but subsequently display the frozen picture until receipt of the freeze-picture release control which is embedded in the video.

NOTE – If an H.261, H.262 or H.263 decoder receives "freeze picture request", it freezes pictures until a freeze-picture release signal is received or a timeout period of at least six seconds has expired. If a terminal wishes to continue the freezing of the picture at the remote end more than six seconds, it should send VCF/H.230 repeatedly with an appropriate period.

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3.1.7 video command "fast update request" (VCU): This symbol is transmitted by an MCU after performing a video switch. It may also be transmitted by a terminal at the start of communication when the video decoder is first ready to receive. On receipt, the terminal video encoder shall enter the fast-update mode at its earliest opportunity.

3.2 C&I related to audio

3.2.1 audio indicate muted (AIM): This symbol is used to indicate that the content of the audio channel does not represent a normal audio signal. The audio encoder may be without audio input or an electronically-generated tone may have been substituted. A terminal receiving AIM shall not mute its loudspeakers in response (otherwise, such tones and the restoration of normal audio would go unheard).

3.2.2 audio indicate active (AIA): Complementary to AIM.

3.2.3 audio command equalise (ACE): Sent by a terminal to request that the delay of the audio signal be equalised to that of the video signal ("lip synchronisation"), in both directions. A terminal sending this request shall itself equalise the delays in the same way.

3.2.4 audio command zero-delay (ACZ): Sent by a terminal to request that the audio signal not be delayed to match that of the video signal.

3.3 C&I for maintenance purposes

3.3.1 loopback command, "video loop request" (LCV): On receipt of this symbol, a terminal shall connect the output of the video decoder to the input of the video encoder.

3.3.2 loopback command, "digital loop request" (LCD): On receipt of this symbol, the terminal shall disconnect the output of the multiplexer from the outgoing path, replacing it with the input to the demultiplexer. In the case of multiple B or H₀ connections, loopback is activated in each connection.

NOTE – If this digital loopback command is issued again, it would come back from the remote terminal. Then the original terminal would respond to this loopback command making a complete loop of the transmission path. Maintenance terminals shall avoid this situation by sending the command only once, or by ignoring the received loopback command.

3.3.3 loopback command, "audio loop request" (LCA): On receipt of this symbol, the terminal should if possible connect the output of the audio decoder to the input of the audio encoder.

3.3.4 loopback command off (LCO): On receipt of this symbol, the terminal shall disconnect all loops and restore audio, video and data paths to their normal condition.

3.4 SBE numbers and characters

SBE numbers

The escape code (111) [19] defined in Recommendation H.221 gives access to a table of 224 numbers having the values 0-223 according to the 8-bit binary code. These SBE values are referred to as "SBE numbers". One SBE number or a string of such numbers is normally preceded by another SBE symbol indicating the purpose for which the number is being sent.

Terminal numbers (see Recommendation H.243) are of the form <M> <T>, where <M> and <T> are each SBE numbers.

SBE characters

The escape code (111) [20] defined in Recommendation H.221 gives access to a table of characters coded as in Table 3. A character or string of characters is normally preceded by another SBE symbol indicating the purpose for which they are being sent.

Where asterisks are used, they identify symbols which shall be followed (always) by at least one SBE number or SBE character. See also Table 4.

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3.5 SBE and MBE symbols used in multipoint working (see Recommendation H.243)

NOTE 1 – Some of the following codes may be cancelled by transmission of appropriate codes as listed in Table 1 but not separately defined here.

NOTE 2 – Any of the symbols prescribed here may be repeated without ill effect: they are part of a set currently in force. An MCU shall expect propagation and processing delays to slow responses from terminals and other MCUs; terminals may repeat a request that an MCU has already satisfied. It is important that terminals receiving SBE symbols that they do not recognize or cannot use shall *ignore* these, not enter any fault recovery process.

MCV	<i>Multipoint Command Visualization-forcing</i> – Transmitted by a terminal to force an associated MCU to broadcast its video signal used to transmit the picture of a chairman or VIP, alternatively to hold a picture source during the transmission of graphics.
MIV	<i>Multipoint Indication Visualization</i> – Transmitted by an MCU to indicate to a terminal that its video signal is being seen by other terminals (otherwise known as "On-air" indication).
MCC	<i>Multipoint Command Conference</i> – Transmitted by an MCU. An endpoint receiving MCC shall make its outgoing transfer rate equal to its incoming transfer rate, and its outgoing audio rate equal to its incoming audio rate. NOTE – The command could also be used to invoke an on-screen user indication.
MCS	<i>Multipoint Command Symmetrical data-transmission</i> – Transmitted by an MCU when setting up data broadcasting. On receipt, a terminal shall prepare itself for data reception and ensure, by mode change if necessary, that its outgoing data channel occupies the same capacity as its incoming data channel. A terminal in receipt of MCS cannot initiate data broadcasting.
MCN	<i>Multipoint Command Negating MCS</i> – Transmitted by an MCU at the completion of data broadcasting. On receipt, a terminal shall close any outgoing data channel which it has opened as a result of the previous reception of MCS. Following the end of data reception and the receipt of MCN, a terminal is permitted to initiate data broadcasting.
MMS	<i>Multipoint command Mode-Symmetrize</i> – Transmitted by an MCU. When in receipt of MMS, endpoints shall respond to the MCU with whatever mode they receive, including audio coding algorithm and rate, data path(s), and video coding algorithm and image format, and also image Profile in the case of H.262. NOTE – If MMS has not been received, terminals are free to follow the mode asymmetry allowed by MCC, e.g. to send H.263 while receiving H.261.
MIZ	<i>Multipoint Indication Zero-communication</i> – Transmitted by an MCU to a terminal for information, with the meaning that no other terminals are yet connected to the MCU.
MIS	<i>Multipoint Indication Secondary-status</i> – Transmitted by an MCU to a terminal for information, with the meaning that since other terminals of higher capability are participating in the conference-call, this terminal will not necessarily receive all the signals that are sent to those other terminals (see Recommendation H.200/AV.243).
MIM	<i>Multipoint Indicate Master-MCU</i> – Transmitted by an MCU which has claimed the master-MCU role.
MIL*	<i>Multipoint Indication Loop</i> – See clause 10/H.243; shall be followed by an SBE number.
MIH	<i>Multipoint Indicate Hierarchy</i> – This capability value indicates that the MCU can operate as a master, a slave, or a sub-slave, in a multi-level hierarchy.
MIJ	<i>Multipoint Indicate Joined_Real_Conference</i> – Sent by an MCU to a terminal to indicate that the terminal has joined an actual conference, and that any terminal numbers or identifiers previously transmitted are no longer valid.
RAN*	<i>RANdom Number</i> – Must be followed by a random SBE number in the range 0-223.

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TIA*	<i>Terminal Indicate Assignment</i> – Used by an MCU to transmit the assigned terminal number to another MCU or to a terminal; shall be followed by <M> <T>.
TIN*	<i>Terminal Indicate Number</i> – Used to pass information concerning terminal number assignments made; shall be followed by <M> <T>.
TIL	<i>Terminal Indicate List</i> – MBE message used to transmit list of terminal numbers currently added into the conference; the message has the form {start-MBE/N/<til>/<M>/<N-2> values of <T>}, where <til> has the value given in Table 2, <M> is a one-byte number assigned to an MCU, and each value of <T> is a one-byte value assigned to a terminal by its local MCU. One such message will be sent for each MCU participating.
TID*	<i>Terminal Indicate Dropped</i> – Used to pass information concerning any terminal number no longer effective; shall be followed by <M> <T>.
TCU	<i>Terminal Command Update</i> – Transmitted by a terminal or MCU to an MCU to request an updated list of terminals connected.
TIF*	<i>Terminal Indicate Floor-request</i> – Transmitted by a terminal to its MCU; shall be followed by <M> <T> – when forwarded from one MCU to another <T> is that of the terminal requesting the floor; when transmitted by the terminal itself <0> <0> shall follow.

TIC	<i>Terminal Indicate Capability</i> – Included in the initial cap-set of a terminal to tell an MCU that it can recognize TIA and return TIX in the additional channels; included in the cap-set of an MCU to say that it can accept additional calls to the same access number and correctly associate additional channels according to the procedure described in Recommendation H.243.
TIX*	<i>Terminal Indicate additional-channel-X</i> – Sent by a terminal having capability TIC in response to TIA; shall be followed by <M> <T>.
TCI	<i>Terminal Command Identify</i> – Sent by an MCU to a directly-connected terminal or vice versa to exact identification by means of a symbol TII*.
TCS- <i>n</i>	<i>Terminal Command String</i> – Sent by an MCU to a directly-connected terminal or vice versa to exact information in the form of a symbol IIS; the meaning according to the different values of <i>n</i> is thus: <i>n</i> = 0: reserved <i>n</i> = 1: password <i>n</i> = 2: identity (person or terminal) <i>n</i> = 3: conference identity <i>n</i> = 4: extension address <i>n</i> = 5 to 31: reserved
TII*	<i>Terminal Indicate Identity</i> – Sent in response to TCI; shall be followed by an SBE alphanumeric character according to 3.4, the content being prescribed by the MCU service provider.
IIS	<i>Information Indicate String</i> – An MBE message sent in response to TCS- <i>n</i> ; the message has the form {start-MBE//N/<iis>/<n>/<N-2> characters} where <iis> has the value given in Table 2, where <i>n</i> corresponds to the value of <i>n</i> in TCS- <i>n</i> ; characters are as specified for TIP.

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TIS	<i>Terminal Indicate identity-Stop</i> – End-marker to indicate the end of a sequence of TII symbols.
TIE	<i>Terminal Indicate End_of_Listing</i> – Sent by an MCU when it has completed the transmission of a series of complementary TIL messages.
TCP	<i>Terminal Command Personal-identifier</i> – Sent by a terminal requesting the MCU to provide the personal identity string associated with the terminal specified by the following identifier <M>, <T>. The MCU responds with TIP.
TIP	<i>Terminal Indicate Personal-identifier</i> – Response to TCP in the form {start-MBE/N/<tip>/m/t/(N-3) characters}, where <tip> has the value given in Table 2. Characters are to Table 3 and m and t are binary numbers representing the terminal number associated with this personal identifier. The null response is of the form {start-MBE/3/<tip>/m/t}.
TCA	<i>Token Command Association</i> – Sent by a terminal requesting the MCU to provide the terminal numbers associated with each token. The MCU responds with an MBE TIR.
TIR	<i>Token Indicate Response</i> – Message of the form {start-MBE/7/<tir>/m1/t1/m2/t2/m3/t3} in response to a TCA where <tir> has the value given in Table 2 and m1/t1 is terminal number of the endpoint with the SD token, m2/t2 is the terminal number of the endpoint with the HSD token, and m3/t3 is the terminal number of the endpoint with the chair token.

VIN*	<i>Video Indicate Number</i> – Transmitted by an MCU to indicate the source (terminal identity number) of the video in the signal; shall be followed by <M> <T>.
VIN2*	<i>Video Indicate Number (2)</i> – This indication is similar to VIN, except that it applies to a composed image, and is sent when a terminal is added to a composed image by the MCU. <M><T> is the terminal number, and can be used to request the associated terminal identity string. <N> is a sub-picture number taken from Figures 2/H.243 to 4/H.243.
VIC*	<i>Video Indicate Compose</i> – This indication informs terminals that picture composition is beginning. The value <M> is a number taken from the rightmost column of Table 4/H.243 that indicates which picture composition method is in use.
VIM	<i>Video Indicate Mixing</i> – Capability value indicating support for both VIC and VIN2; only applies to an MCU.
VCB*	<i>Video Command Broadcast</i> – Transmitted by a chair-control terminal or an MCU to an MCU to cause broadcasting of the video from the terminal whose identity number follows VCB.
Cancel-VCB	<i>Cancel Video Command Broadcasting</i> – Returns the conference to voice-activated video switching.
VCS*	<i>Video Command Select</i> – Transmitted by a terminal to an MCU to cause transmission to itself of the video from the terminal whose identity number follows VCS, if this requirement does not conflict with a VCB requirement.
Cancel-VCS	Transmitted by a terminal to return to automatic video switching at the MCU.
VCR	Transmitted by an MCU when it cannot comply with the commands VCB or VCS, for whatever reason.

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CIC	<i>Chair-control Indicate Capability</i> – Included in the cap-set of an MCU to show that it can properly process the codes (CCA, CIT, CCR, CIS, CCD, CIR, CCK), (TIA, TIN, TID, TIL, TCU, TIF), (VCB, VIN, VCR, VCE).
CCD*	<i>Chair Command Disconnect</i> – Transmitted by a chair-control terminal to an MCU to cause dropping of the terminal whose identity number follows.
CIR	<i>Chair Indicate Release/refuse</i> – Transmitted by an MCU when it cannot comply with the command CCD.
CCK	<i>Chair Command Kill</i> – Transmitted by a chair-control terminal to drop all terminals from the conference.

CCA	<i>Chair Command Acquire</i> – Transmitted by a terminal or MCU to claim a chair-control token.
DCA-L* DCA-H*	<i>LSD/HSD Command Acquire-token</i> – Transmitted by a terminal or MCU to claim an LSD/HSD token; shall be followed by an SBE number indicating the data rate requested (see Tables 2/H.243 and 3/H.243).
CIT	<i>Chair Indicate Token</i> – Used by an MCU to pass the chair-control token.
DIT-L	<i>LSD Indicate Token</i> – Used by an MCU to pass the LSD token.
DIT-H	<i>HSD Indicate Token</i> – Used by an MCU to pass the HSD token.
CCR	<i>Chair Command Release/refuse</i> – Used by an MCU to withdraw/refuse assignment of chair-control token.
DCR-L DCR-H	<i>LSD/HSD Command Release/refuse</i> – Used by an MCU to withdraw/refuse assignment of LSD token, or by the chair-control terminal to cause this withdrawal.
CIS	<i>Chair Indicate Stopped-using-token</i> – Transmitted by a terminal holding the chair token to release it.
DIS-L	<i>LSD Indicate Stopped-using-token</i> – Transmitted by a terminal holding the LSD token to release it.
DIS-H	<i>HSD Indicate Stopped-using-token</i> – Transmitted by a terminal holding the HSD token to release it.
DCC-L DCC-H	<i>LSD/HSD Command Close</i> – Transmitted by a terminal holding the LSD/HSD token to release it and close the LSD/HSD channel.
DCM	<i>Data Command MLP</i> – Transmitted by a terminal to trigger establishment of an MLP channel

3.6 SBE symbols used in channel aggregation and restricted network situations

3.6.1 [AggIN]*: A double SBE symbol indicating the number **n** as determined by the procedure described in Recommendation H.244. The sequence is (111) [17] (011) [5] followed by an SBE number.

3.6.2 network indicate incompatible-aggregators (NII): Transmitted by a Channel Aggregator when this is the cause of the call remaining on the initial connection only (see Recommendation H.244).

3.6.3 Restricted_network Indicate Restrict (RIR): Used between MCUs – see Recommendation H.243.

3.6.4 Restricted_network Indicate Denied (RID): Used between MCUs – see Recommendation H.243.

3.6.5 Restricted_network Indicate Unrestrict (RIU): Used between MCUs – see Recommendation H.243.

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3.7 Symbols used in the transfer of network addresses (Recommendation H.242)

3.7.1 network indicate address – using MBE (NIA-m): Sent in response to NCA-i or NCA-a when the remote terminal has MBE capability. The message has the form:

$$\{\text{start-MBE/N/}<\text{nia}>/\text{n}/\text{d}_1,\text{d}_2/\text{d}_3,\text{d}_4/\text{.....}\}$$

where:

n = number of the channel that the network address is to be used for;

d₁ = first digit of the number to be dialled coded as a 4-bit binary number;

d₂ = second digit to be dialled, etc.

There are N-2 groupings of packed digits. Between the country code, to Recommendation E.164/E.163, and the national number the 4-bit nibble 1100 is inserted; no local prefix is included. If the last digit occupies the first four bits of the Nth byte, the remaining four bits are filled also with 1100.

As an example, the address +44 1473 642402 is transmitted as:

$$\{\text{start-MBE}/9/ <\text{nia}> / \text{n} / 0100\ 0100 / 1100\ 0001 / 0100\ 0111 / 0011\ 0110 / 0100\ 0010 / 0100\ 0000 / 0010\ 1100\}$$

Partial network addresses:

$$\{\text{start-MBE}/N/ <\text{niap}> / \text{n} / \text{p}_1,\text{p}_2 / \text{p}_3,\text{p}_4 / \text{.....} \text{p}_x\}$$

Here the address of channel n = (n₀ + 1) is indicated by taking the address of channel n = n₀ by replacing the last x digits by the values p₁.....p_x. If x is odd, again the vacant final four bits are filled with 1100. This allows much time to be saved if all the NIAs differ by one or two digits. Clearly, if channels n₀ and n₀ + 1 have the same address, the latter is conveyed by {start-MBE/2/<niap>/n₀+1}.

Following the above example, if the next address is +44 1473 64 2403 the message is:

$$\{\text{start-MBE}/3/ <\text{niap}> / \text{n} + 1 / 00111100\}$$

3.7.2 network command send_address-initial (NCA-i): Sent by a calling equipment to elicit details of network addresses of the initial connection.

3.7.3 network command send_addresses-additional (NCA-a): Sent by a calling equipment to elicit details of network addresses of additional connections.

3.7.4 network indicate addresses – using SBE (NIA-s): Sent in response to NCA-i or NCA-a when the remote terminal has no MBE capability. This symbol is followed by a string of SBE numbers: the first is the number N of following numbers forming the complete "message" and the subsequent symbols have the same form as the string defined above for <nia>, namely d₁,d₂/d₃,d₄/..... Thus the number +44 1473 642402 is conveyed by:

$$\{\text{NIA}\}\{\text{num}/7\}\{\text{num}/0100\ 0100\}\{\text{num}/1100\ 0001\}\{\text{num}/0100\ 0111\}\{\text{num}/0011\ 0110\}$$
$$\{\text{num}/0100\ 0010\}\{\text{num}/0100\ 0000\}\{\text{num}/0010\ 1100\}$$

Other BAS codes may be inserted between {bracketed} byte groups in the sequence but not between <NIA> and the following symbol.

3.7.5 network indicate same_addresses (NIS): Sent in response to NCA-a when the called end has all its additional addresses the same as the initial one.

3.7.6 network indicate consecutive_addresses (NIC): Sent in response to NCA-a when the called end has all its additional addresses consecutively in a sequence above the initial one.

3.7.7 network indicate double_addresses (NID): Sent in response to NCA-a when there are two connections available at each network address and the addresses are consecutive.

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3.7.8 network indicate query_address – using SBE (NIQ-s): Sent when a called terminal wishes to advise the calling terminal that it should seek the full network address before attempting to establish additional connections – see H.242.

3.7.9 network indicate query_address – using MBE (NIQ-m): As for NIQ-s, additionally informing that MBE-coded addresses can be processed.

3.7.10 network indicate refuse-address (NIR): Sent by a terminal in response to NCA-i or NCA-a when the requested address information is not to be divulged.

3.8 Symbols used in the indication of mode preferences (Recommendation H.242)

The values (100) [0-31] of Table 4 are assigned for mode-preference indication according to the procedure of 9.5/H.242; the prefix \emptyset is used to distinguish the names from capabilities and commands. In the case of audio modes, these correspond to commands listed in A.1/H.221. Video modes, however, correspond to capabilities listed in A.5/H.221 and clause 5/H.242, the parameters of transmitted video signals being contained within the video stream. The MLP-rate value is used as the first symbol in a string defined in Recommendation H.243.

3.9 Symbols for other purposes

1997 Recs. Transmitted by an endpoint to indicate conformance to 1997-revised versions of Recommendations H.221, H.242 and H.230.

4 Requirements for C&I

The C&I functions are defined such that, under various appropriate circumstances, the audiovisual system will operate in a fault-free manner and also such that sympathetic presentation to users is possible. Some functions should therefore be mandatory, others optional. This clause together with the categorization in Table 1, clarifies the circumstances under which C&I functions are mandatory.

CM Conditionally mandatory: If the terminal (or MCU) is capable of entering the given state, then it shall transmit the given code and, when leaving that state, the complementary code. If it has no such capability it can ignore both.

M Mandatory: For all equipments of either terminal or MCU type.

X Non-mandatory: On receipt of such a code, it may be unrecognized, or recognized but not acted upon, or recognized and acted upon, entirely at the discretion of the manufacturer or user.

NA The code is not applicable in that case.

Directivity of the C&I signal: See Recommendation H.243 for whether it is mandatory or optional to the terminal or MCU.

It will be noted that there are only a few mandatory requirements on most terminals. All audiovisual terminals shall recognize and obey the command to make or break the digital loopback, and video loopback if they have video capability. All terminals having a video capability shall also obey fast-update, freeze-picture, and MCS/MCN, otherwise there will be system misoperation on a multipoint call.

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Table 1/H.230

Code first 3 bits	Code last 5 bits in decimal form	Abbreviation	Transmit		Receive		Reference for procedures	
			Terminal	MCU	Terminal	MCU		
Code (000)	[0,1]	Reserved for audio-related symbols						
	[2]	AIM	CM	CM	X	X	3.2	
	[3]	AIA	CM	CM	X	X	3.2	
	[4]	ACE	CM	CM	CM	CM	3.2	
	[5]	ACZ	CM	CM	CM	CM	3.2	
	[6]-[7]	Reserved for audio-related symbols						
	[8]	TCI	#	#	#	#	H.243	
	[9]	TII*	#	#	#	#	H.243	
	[10]	TIS	#	#	#	#	H.243	
	[11]-[15]	Reserved						
	[16]	VIS	CM	CM	X	X	3.1	
	[17]	VIA	CM	CM	X	X	3.1	
	[18]	VIA2	X	NA	X	X	H.320	
	[19]	VIA3	X	NA	X	X	H.320	
	[20]	VIC*	#	#	#	#	H.243	
	[21]	Reserved						
	[22]	VIN2***	#	#	#	#	H.243	
	[23]	VIM	#	#	#	#	H.243	
	[24]-[30]	Reserved for video-related symbols						
	[31]	VIR	X	NA	X	NA	H.320	
	Code (001)	[0]	MCC	NA	M	M	CM	H.243
		[1]	Cancel-MCC	NA	M	M	CM	H.243
		[2]	MIZ	#	#	#	#	H.243
[3]		Cancel-MIZ	#	#	#	#	H.243	
[4]		MIS	#	#	#	#	H.243	
[5]		Cancel-MIS	#	#	#	#	H.243	
[6]		MIM	#	#	#	#	H.243	
[7]		TIC	#	#	#	#	H.243	
[8]		TIX**	#	#	#	#	H.243	
[9]		RAN	#	#	#	#	H.243	
[10]		MIH	#	#	#	#	H.243	
[11]		TIA**	#	#	#	#	H.243	
[12]		TIN**	#	#	#	#	H.243	
[13]		TID**	#	#	#	#	H.243	
[14]		TCU	#	#	#	#	H.243	
[15]		TCA	#	#	#	#	H.243	
[16]		MCV	#	#	#	#	H.243	
[17]		Cancel-MCV	#	#	#	#	H.243	
[18]		MIV	#	#	#	#	H.243	
[19]		Cancel-MIV	#	#	#	#	H.243	
[20]		MCS	#	#	#	#	H.243	
[21]		MCN	#	#	#	#	H.243	
[22]		VIN**	#	#	#	#	H.243	
[23]		VCB**	#	#	#	#	H.243	
[24]		Cancel-VCB	#	#	#	#	H.243	
[25]		VCS**	#	#	#	#	H.243	
[26]		Cancel-VCS	#	#	#	#	H.243	
[27]		VCR	#	#	#	#	H.243	
[28]		MMS	#	#	#	#	H.243	
[29]		Cancel-MMS	#	#	#	#	H.243	
[30]		Cancel-MIM	#	#	#	#	H.243	
[31]	MIL*	#	#	#	#	H.243		

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Table 1/H.230 (concluded)

Code first 3 bits	Code last 5 bits in decimal form	Abbreviation	Transmit		Receive		Reference for procedures	
			Terminal	MCU	Terminal	MCU		
Code (010)	[0]	CIC	#	#	#	#	H.243	
	[1]	CCD**	#	#	#	#	H.243	
	[2]	CIR	#	#	#	#	H.243	
	[3]	CKK	#	#	#	#	H.243	
	[4]	CCA	#	#	#	#	H.243	
	[5]	CIT	#	#	#	#	H.243	
	[6]	CCR	#	#	#	#	H.243	
	[7]	CIS	#	#	#	#	H.243	
	[8]	TIF**	#	#	#	#	H.243	
	[9]	TIE	#	#	#	#	H.243	
	[10]-[14]	Reserved						
	[15]	MIJ	#	#	#	#	H.243	
	[16]	DCA-L	#	#	#	#	H.243	
	[17]	DIT-L	#	#	#	#	H.243	
	[18]	DCR-L	#	#	#	#	H.243	
	[19]	DIS-L	#	#	#	#	H.243	
	[20]	DCC-L	#	#	#	#	H.243	
	[21]-[23]	Reserved						
	[24]	DCA-H	#	#	#	#	H.243	
	[25]	DIT-H	#	#	#	#	H.243	
	[26]	DCR-H	#	#	#	#	H.243	
	[27]	DIS-H	#	#	#	#	H.243	
	[28]	DCC-H	#	#	#	#	H.243	
	[29]-[30]	Reserved						
	[31]	DCM	#	#	#	#	H.243	
	Code (011)	[0]	TCS-0	#	#	#	#	H.243
		[1]	TCS-1	#	#	#	#	H.243
		[2]	TCS-2	#	#	#	#	H.243
		[3]	TCS-3	#	#	#	#	H.243
		[4]	TCP**	#	#	#	#	H.243
		[5]	AggIN*			CM	CM	H.244
[6]		NCA-i	CM	CM	CM	CM	H.242	
[7]		NCA-a	CM	CM	CM	CM	H.242	
[8]		NIS	CM	CM	CM	CM	H.242	
[9]		NIC	CM	CM	CM	CM	H.242	
[10]		NID	CM	CM	CM	CM	H.242	
[11]		NII			CM	CM	H.244	
[12]								
[13]		NIA-s	CM	CM	CM	CM	H.242	
[14]		NIQ-s	CM	CM	CM	CM	H.242	
[15]		NIQ-m	CM	CM	CM	CM	H.242	
[16]		NIR	CM	CM	CM	CM	H.242	
[17]		TCS-4	#	#	#	#	H.243	
[18]-[28]		Reserved						
[29]		RIR	NA	#	NA	#	H.243	
[30]	RID	NA	#	NA	#	H.243		
[31]	RIU	NA	#	NA	#	H.243		
Code (111)	All values forbidden							
Codes listed in Annex A/H.221								
		VCF	X	M	M	M		
		VCU	X	M	M	M		
		LCV	NA	NA	CM	NA		
		LCA	NA	NA	X	X		
		LCD			M	-	H.242, H.320	
		LCO			M	-	H.242, H.320	
* The number of * indicates how many SBE number or SBE character values must follow the symbol.								
# Indicates the direction in which the symbol is transmitted.								

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Table 2/H.230 – Values assigned to type identification bytes in MBE messages

0000 0000	Reserved
0000 0001	Reserved
0000 0010	<til> – See Rec. H.243
0000 0011	<iis> – See Rec. H.243
0000 0100	<tir> – See Rec. H.243
0000 0101	<tip> – See Rec. H.243
0000 0110	<nia> – See Rec. H.242
0000 0111	<niap> – See Rec. H.242
0000 1000	<Au_MAP> – See Rec. J.52
0000 1001	<Au_COM> – See Rec. J.52
0000 1010	<H.262/H.263> – See Rec. H.242
0000 1011	<ident> – See Rec. H.242
0000 1100 to 1101 1111	Reserved
1110 0000 to 1111 1111	forbidden

Table 3/H.230

		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		(000)	(000)	(001)	(001)	(010)	(010)	(011)	(011)	(100)	(100)	(101)	(101)	(110)	(110)	(111)	(111)
		[0-15]	[16-31]	[0-15]	[16-31]	[0-15]	[16-31]	[0-15]	[16-31]	[0-15]	[16-31]	[0-15]	[16-31]	[0-15]	[16-31]	[0-15]	[16-31]
[0]	[16]			SP	0	@	P	`	p				°				
[1]	[17]			!	1	A	Q	a	q			i	±	grave			
[2]	[18]			"	2	B	R	b	r			¢	²	acute			
[3]	[19]			#	3	C	S	c	s			£	³	circumflex			
[4]	[20]			\$	4	D	T	d	t				×	tilde			
[5]	[21]			%	5	E	U	e	u			¥	μ	macron			
[6]	[22]			&	6	F	V	f	v				¶	breve			
[7]	[23]			'	7	G	W	g	w			§	·	dot-above			
[8]	[24]			(	8	H	X	h	x			¤	÷	umlaut			
[9]	[25]			)	9	I	Y	i	y								
[10]	[26]			*	:	J	Z	j	z					ring			
[11]	[27]			+	;	K	[	k	{			«	»	cedilla			
[12]	[28]			,	<	L	\	l	|				¼				
[13]	[29]			-	=	M	]	m	}				½	double acute			
[14]	[30]			.	>	N	^	n	~				¾	ogonek			
[15]	[31]			/	?	O	_	o					ı	caron			
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

The diacritical marks in column 12 apply to the adjacent character in the same way as in Recommendation T.51.

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Table 4/H.230 – Occupancy of escape table reached from (111) [17] of Table A.1/H.221

	(000)	(001)	(010)	(011)	(100)	(101)	(110)	(111)
[0]		MCC	CIC (cap)	TCS-0	øA-law,0F	1997 Recs.		
[1]		Cancel-MCC	CCD**	TCS-1	øµ-law,0F			
[2]	AIM	MIZ	CIR	TCS-2	øG.722-m2			
[3]	AIA	Cancel-MIZ	CCK	TCS-3	øG.722-m3			
[4]	ACE	MIS	CCA	TCP**	øG.728			
[5]	ACZ	Cancel-MIS	CIT	AggIN*				
[6]		MIM	CCR	NCA-i				
[7]		TIC (cap)	CIS	NCA-a				
[8]	TCI	TIX**	TIF**	NIS	øH.261/QCIF			
[9]	TII*	RAN*	TIE	NIC	øH.261/CIF			
[10]	TIS	MIH (cap)		NID	øH.262S_SIF			
[11]		TIA**		NII	øH.262S_2SIF			
[12]		TIN**			øH.262S_4SIF			
[13]		TID**		NIA-s	øH.262M_SIF			
[14]		TCU		NIQ-s	øH.262M_2SIF			
[15]		TCA	MIJ	NIQ-m	øH.262M_4SIF			
[16]	VIS	MCV	DCA-L	NIR	øH.263_SQCIF			
[17]	VIA	Cancel-MCV	DIT-L	TCS-4	øH.263_QCIF			
[18]	VIA2	MIV	DCR-L		øH.263_CIF			
[19]	VIA3	Cancel-MIV	DIS-L		øH.263_4CIF			
[20]	VIC*	MCS	DCC-L		øH.263_16CIF			
[21]		MCN						
[22]	VIN2***	VIN**						
[23]	VIM (cap)	VCB**						
[24]		Cancel-VCB	DCA-H					
[25]		VCS**	DIT-H					
[26]		Cancel-VCS	DCR-H					
[27]		VCR	DIS-H					
[28]		MMS	DCC-H					
[29]		Cancel-MMS		RIR				
[30]		Cancel-MIM		RID				
[31]	VIR	MIL*	DCM	RIU	øMLP_rate			

The number of * indicates how many SBE number or SBE character values must follow the symbol.
 ø Prefix identifying Mode-preference indication symbols.
 (cap) identifies the only values that are allowed inside a capability set (see Recommendation H.242).

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