1. Abstract

This document is a proposal to add new event/signal packages to the Megaco protocol to control line side gateways connected to a variety of business and home telephones. And trunk side gateways connected to the PSTN.

NOTE: This document is a work in progress, known to be incomplete in some areas, and leaves several issues unresolved.

2. Introduction

The first set of packages (section 3.1 to 3.7) addresses the
requirements of line side gateways. These packages combine signals and events that apply to multiple types of gateways connected to line side devices. The line side devices to be supported are:

- Analog Phone (Tone and Pulse) (Black Phone)
- High End Home Phone
- Alternative access phone (cable modem, ADSL, Fixed Wireless)
- ADSI Phone
- Analog Business Phone
- Digital Business Phone
- IP Business Phone

The second set of packages (sections 3.8 to 3.12) addresses the requirements of trunk side gateways. These gateways connect the IP world to the PSTN through trunk lines.

2.1 Assumptions:

Ephemeral terminations are selected by MG, 'static' terminations are selected by the MGC.
In case that the dialed number is unallocated, the respective "no circuit tone" is national specified.

3. Addition/Modification of the following to chapter '7.3.2.9 Local Descriptor' of H.248:
The Mode parameter indicates the relation between the Termination and the "star" connection of the Context. The allowed values are "send only" (sendonly), "receive only" (recvonly), "send/receive" (sendrecv), "inactive" (inactive), "outofservice", "loopback" (as given in ITU-T Recommendation Q.724 for the continuity check procedure, where the check loop is connected to the go and return path) and "test" (test). "Send" and "Receive" are with respect to the Termination, so that, for example, a stream set to mode=sendonly can talk but it cannot listen.

2.2 Abbreviations

- AAA Authentication Authorization and Accounting
- CAS Channel Associated Signalling
- ISUP ISDN User Part
- L2TP Layer 2 Tunnelling Protocol
- NAS Network Access Server

2.3 Definitions:

- String: Null terminated, 8-bit Unicode UTF-8 string
- Integer: 4 byte signed integer
- Character: Unicode UTF-8 encoding of a single letter
(could be more than 1 octet)
3. Signal and Event packages

3.1 Generic audio Package

Short name: gaudio

This package is used to detect and apply audio tones.

3.1.1 Properties Audit Information

3.1.1.1 Gateway Audit Information

The following is returned as a result of Audit command at the root MG:

3.1.1.1.1 listoftones

Short name tlist

String of toneids whose definition is available on the MG, separated by '/'. Default toneids could be modified using the deftone signal. New tones could also be defined using deftone.

Example: "mt/fd/lt"

Toneids are described later

3.1.1.2 Termination Audit Information

The following is returned as a result of Audit command at a particular physical device termination.

None

Events

3.1.2.1 Event Configuration

3.1.2.1.1 ToneStartDetected

Short name tonestdt

Configuration Parameters:

streamid id of audio stream to detect tones on.

Return value: integer

0 Success
1 streamid not recognized
99 undetermined error

3.1.2.1.2 ToneEndDetected

Short name toneenddt

Configuration Parameters:

streamid id of audio stream to detect tones on.
3.1.2.1.3 LongToneDetected

Short name lgtonedt

Configuration Parameters:

streamid     id of audio stream to detect tones on.
longduration value of long duration to test against in ms.

Return value:        integer         0 Success
                     1 streamid not recognized
                     99 undetermined error

3.1.2.2 Observed events

3.1.2.2.1 ToneStartDetected

Short name tonestdt

Event Parameters:

toneId       Short string

nameStr      the name of the tone in text

3.1.2.2.2 ToneEndDetected

Short name toneenddt

Event Parameters:

toneId       Short string

nameStr      the name of the tone in text
duration     is in milliseconds and is the duration of the continual
detection of the tone.

3.1.2.2.3 LongToneDetected

Short name lgtonedt

This event is reported if a tone is continuously present for
"longduration" specified in the configure parameters above.

Event Parameters:

toneId       Short string

nameStr      the name of the tone in text

Detectable ToneIds:
3.1.3 Signals

3.1.3.1 PlayTone

short name playtone

Signal Parameters:

streamid id of audio stream to play tones on.
toneid Tone to be played
signaltype Possible values:
  "BR" brief duration (provisioned / implied)
  "ON" Play until instructed to stop
  "TO" Play until timed out
duration timeout duration in ms

Return value: integer
  0 Success
  1 streamid not recognized
  2 toneid not recognized
  3 signaltype error
  99 undetermined error

3.1.3.2 StopTone

short name stoptone

stop tone play on streamid
Signal Parameters:

streamid     id of audio stream to detect tones on.

Return value:        integer         0 Success
                    1 streamid not recognized
                    99 undetermined error

ToneIds:

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aw     - Answer Tone
bz     - Busy Tone
wt     - Call Waiting Tone
dl     - Dial Tone
rb     - Ringback
nbz    - Network Busy Tone (reorder or fast cycle busy)
rs     - Ring Splash Tone
p      - Prompt Tone
e      - Error Tone
dsdl   - Stutter Dial Tone (??)
v      - Alerting Tone
y      - Recorder Warning Tone (??)
sit    - SIT Tone (??)
z      - Calling Card Service Tone (??)
ct     - Off Hook Warning Tone
s(###) - Distinctive Tone Pattern Tone
sil    - Silence Tone

[editor's note:
semantic for all all tonid’s must be defined
non internatinal taken off list
add bob’s tone definition stuff
Audit: gives you pre-provisioned tones definitions
Def tone allows you to overwrite existing tones or add others. When
you delete tone you revert to original]

3.1.3.2 Define Tone

short name deftone

define a new tone for playback or redefine an existing tone. If
deftone is sent to a termination in a specific context, the tone
definition or redefinition would only be temporary and available in
the context

The syntax for the tone definition parameter is recursive and uses
parenthesis as a delimiter of elements.

Note: to remove a dynamically defined tone, simply issue the signal
with the desired ToneId and a NULL deftone parameter. Only
dynamically defined tones (i.e. tones defined using deftone) may be
deleted.

DefToneCmd = ToneID "=" DefToneString

DefToneString = "(" DefToneElement ["*" RepeatCount ] ")" 
[","+/+"/"X"
DefToneString]
NOTE: a separator of ‘,’ indicates that the next definition follows sequentially in time; a separator of ‘+’ indicates that the following tone is to be mixed with the previous tone and is simultaneous with it; a separator of ‘X’ indicates that the first tone is modulated by the second tone.

Note: Recursion is limited to a maximum of 32 Levels. All IPPhone MGs must support at least 4 levels of recursion.

RepeatCount = %d1-32767 / %d0
NOTE: repeatcount of 0 indicates infinite repeating.

DefToneElement = ToneName ["," ToneDuration [ "," ToneAmplitude ]]
ToneName = ToneID / "#"FreqValue / "&"AnnouncementParameterList
ToneID = 1*VCHAR; Unique tone identity string or value
FreqValue = %d0-4000; in Hertz
AnnouncementParameterList = AnnouncementID [""," SubstitutionString]
AnnouncementID = 1*VCHAR; Unique identifier for an audio announcement
SubstitutionString = """"1*VCHAR""""; a TTS string to be inserted into an announcement.
ToneDuration = %d1-32767 / %d0 ; In Milliseconds
NOTE: ToneDuration of 0 indicates infinite duration or duration defined by the ToneID.
ToneAmplitude = "-"%d32-1 / %d0; In dBm0

An examples of some tone definitions follows.

ReorderTone = (((#480)+(#620)),250,-24),(sil,250))*0
SITTone = (#950,330,-24), (sil,30), (#1400,330,-24), (sil,30), (#1800,330,-24), (sil,30)
NumberYouHaveDialed = (SITTone), (&NumberDialed,"555-1234")

Note: above tone definitions are from SR-TSV-002275.

Return value: integer
0 Success
4 Tone definition not understood
99 undetermined error

3.2 Generic DTMF Package
Short name gdtmf

This package it used to detect and generate tones on the analog trunk or line connection on a media gateway.

3.2.1 Properties audit
3.2.1.1 Gateway Audit Information

The following is returned as a result of Audit command at the root MG:

3.2.2 Events

3.2.2.1 Event Configuration

3.2.2.1.1 ToneDetected

Short name tonedt

Configuration Parameters:

streamid id of audio stream to detect tones on.
listoftones a string containing one or more of the dtmftoneid’s to be detected, separated by /
Example: "0/1/2/3/4/5/6/7/8/9/*/#".

dtmftoneid’s:
'0','1','2','3','4','5','6','7','8','9','*','#','A','B','C','D','X'
'X' represents all digits from 0 to 9.
'L' Long Duration

'A','B','C','D' can be redefined using the deftone signal in the previous packages

Return value: integer 0 Success 1 streamid not recognized 2 toneid not recognized 99 undetermined error

3.2.2.1.2 SilenceDetected

Short name silencedt

This event is triggered after a period of silence has occurred following the detection of a DTMF digit.

Configuration Parameters:

streamid id of audio stream to detect tones on.
duration Silence duration that would trigger the event in ms.

Return value: integer 0 Success 1 streamid not recognized 99 undetermined error

3.2.2.2 Observed Events

3.2.2.2.1 ToneDetected

Short name tonedt

Event Parameters:
eventtype Possible values:
   "MULTI": multiple digits have been accumulated and
   sent.
   "START": one tone start detected
   "LONG": one tone has been detected for more than 2 seconds
           (Configurable)
   "END": one tone end detected.

content a string containing one or more dtmftoneid’s

duration this parameter is used when eventtype is "END" is
represents the total duration for which the tome was detected in ms

dtmftoneid’s:
   '0','1','2','3','4','5','6','7','8','9','*','#','A','B','C','D'

3.2.2.2 SilenceDetected

Short name silencedt

Event Parameters:

3.2.3 Signals

3.2.3.1 PlayTone

short name playtone

Signal Parameters:

streamid - integer: id of audio stream to play tones on.
dtmftoneid - integer: Tone to be played
signaltype - string Possible values:
   "BR" brief duration (provisioned / implied)
   "ON" Play until instructed to stop
   "TO" Play until timed out.
duration timeout duration in ms

possible value for dtmftoneid:

0 - dtmf0
1 - dtmf1
2 - dtmf2
3 - dtmf3
4 - dtmf4
5 - dtmf5
6 - dtmf6
7 - dtmf7
8 - dtmf8
9 - dtmf9
10 - dtmf*
11 - dtmf#
12 - dtmfA
13 - dtmfB
14 - dtmfC
15 - dtmfD
16 - echo dtmf0
17 - echo dtmf1
18 - echo dtmf2
19 - echo dtmf3
20 - echo dtmf4
21 - echo dtmf5
22 - echo dtmf6
23 - echo dtmf7
24 - echo dtmf8
25 - echo dtmf9
26 - echo dtmf*
27 - echo dtmf#
28 - echo dtmfA
29 - echo dtmfB
30 - echo dtmfC
31 - echo dtmfD

echo dtmfs are intended to be played back to the user and will have a lower amplitude than dtmfs.

Return value: integer
0 Success
1 streamid not recognized
2 toneid not recognized

(dtmftoneid)
3 signaltype error
99 undetermined error

3.2.3.2 StopTone

short name stoptone

stop tone play on streamid. Cancels all playtone signals.

Signal Parameters:
streamid id of audio stream to detect tones on.

Return value: integer
0 Success
1 streamid not recognized
99 undetermined error

3.3. Dialpad Package

Short name: dpad

The dialpad package is used to represent a standard 10 digit key pad plus the '*', '#', A, B, C, and D keys.

Standard dialpad identifiers (dialpadId) include:

'0','1','2','3','4','5','6','7','8','9','*','#','A','B','C','D'

3.3.1. Properties Audit

3.3.1.1 Gateway Properties Audit
None.

3.3.1.2  Termination Properties Audit

3.3.1.2.1  number of keys: short name nkeys

- 10 keys are 0-9
- 12 keys are 0-9, *, #
- 16 keys are 0-9, *, #, A, B, C, D

3.3.2  Events

3.3.2.1  Event Configuration

3.3.2.1.1  Dialpad Key Down: Short name kdwn

Configure Parameters:

None

3.3.2.1.2  Dialpad Key Up: Short name kup

Configure Parameters:

None

3.3.2.2  Observed Events

3.3.2.2.1  Dialpad Key Down: Short name kdwn

Event Parameters:

dialpadId  - Character: representing key pressed

Standard dialpad identifiers (dialpadId) include:

'0', '1', '2', '3', '4', '5', '6', '7', '8', '9', '*', '#', 'A', 'B', 'C', 'D'

3.3.2.2.2  Dialpad Key Up: Short name kup

Event Parameters

dialpadId  - character: representing key pressed
duration   - integer = dialpad key press duration in ms

3.3.3  Signals

3.3.3.1  Dialpad Echo: Short name echo

It turn DTMF tone echo on and off. It is typically used to feedback keypresses.
Signal parameters:

- echoCtrl: String: "On" or "Off". Default = on
- direction: Character: 'U' = to user / 'A' = Away from user / 'B' = Both
- duration: Integer: tone duration in ms (default = "track keypad")

Note: Direction parameter is intended to specify how the context streams the injected tones, 'U' (towards the audio transducer), or 'A' (towards the network through RTP). DTMF tones that are played through the audio transducers are at reduced amplitude.

3.3.4. Statistics
None.

3.4. Function Key Package

Short name: fkey

Events associated with the common telephone function keys are defined in this package. This allows, for example, line keys to be implemented without specific knowledge of the physical layout of the telephone. Function keys may have well-known names, for example: Hookswitch, Hold, or Forward. Function keys may also be assigned a name identifier by the MGC, which is returned as part of the key events.

3.4.1. Properties Audit

Gateway Properties Audit

3.4.1.2 Termination Properties Audit

3.4.1.2.1 Function Key List

Short name: list

Return values: Returns list of all function keys

list - String representing: (key *(,key))
key = (id, name if assigned, key name is settable or not).

list Example: 
"(0,,Y),(1,LineKey1,Y),(2,52489,Y),(3,Hold,N)"

The standard function key well-known names include the following strings:

"hksw" - Hookswitch
"hold" - Hold
"conf" - Conference
"fwrk" - Conference
"tsfr" - Transfer
"l???" - LineKey<n>
"f???" - FunctionKey<n>
3.4.2. Events

3.4.2.1. Event Configuration

3.4.2.1.1 Function Key Down: Short name kdwn

3.4.2.1.2 Dialpad Key Up: Short name kup

3.4.2.2. Observed Events

3.4.2.2.1 Function Key Down: Short name kdwn

Event Parameters:

keyId      - integer: function key id
nameStr    - string: containing stored name value

3.4.2.2.2 Dialpad Key Up: Short name kup

Event Parameters:

keyId      - integer: function key id
nameStr    - string: containing stored name value
duration   - integer: key press duration in milliseconds

3.4.3. Signals

3.4.3.1 Assign Function Key Name

Short name: asgnm

Signal Parameters:

keyId      - integer: function key id
nameStr    - string: containing stored name value

3.4.4 Statistics

None

3.5 Indicator Package

Short name: ind

Signals associated with the common telephone indicators are defined in this package. This allows, for example, indicators to be implemented without specific knowledge of the physical layout of the telephone. Indicators may have well known identifier names, for example: message waiting, hold, line active, and may be alterable as in Function Key Package.
3.5.1 Properties Audit

Gateway Properties Audit

3.5.1.2 Termination Properties Audit

3.5.1.2.1 Indicators List

Short name: list

Return values: Returns list of all indicators
List - String representing: (indicator *(,indicator))
indicator = (id, name if assigned, attributes).

List Example: "(0,,Y),(1,LineKey1,Y),(2,52489,Y),(3,Hold,N)"

Peter

The standard indicator well known names include:

"mwat"   - Message waiting indicator
"hold"   - Hold On/Off
"conf"   - Conference
"ring"   - Ringer/Alerner
"l???
"f???

The standard attributes include:

* on, off, blink, fast blink, slow blink, invert, color.

[[ Note: Need to define attributes appropriate for audible alerts such as ringing, page, possibly error tones etc. These may need to be aligned with other Megaco packages. ]]

[[ ISSUE: Should consider additional package specifically for audible indicators. Left for further study. ]]

3.5.2. Events

3.5.2.1. Event Configuration

None.

3.5.2.2. Observed Events

3.5.3. Signals

3.5.3.1. Set Indicator

Short name: SetInd

Signal Parameters:

indicatorId    Integer
attribute      on, off, blink, fast_blink, slow_blink, invert, color.
5.4.3.2. Set Name

Short name: SetName

indicatorId  Integer
nameStr      string

5.4.4. Statistics

None.

3.6. Monochrome Text Display Package

Short name: mtdisp

The text display package supports signals associated with the text display elements.

Carriage return &lt;Unicode U+000D&gt; is supported in-string, and moves the text input to the beginning of the next line, clearing the remainder (if any) of the current line. Text wrapping is not provided.

Unicode is supported to provide support for multiple languages. The Unicode Standard, Version 2.0 or ISO/IEC 10646-1:1993 shall be the definitive standard intended when the term Unicode is used within the context of this document. All text display elements shall at least support the Unicode pages U+0000 -&gt; U+00ff as the basic character set. All of the text strings shall be encoded using UTF-8 as defined in ISO/IEC 10646 AM1.

Property Audit

Gateway Property Audit

Returns the number of displays supported (integer value) and an IDs for each display (integer value).

3.6.1.2 Termination Property Audit

Returns a display’s parameters

nrows  - integer: number of rows
ncols  - integer: number of columns
cdgps  - string: list of supported Unicode code pages
cpos   - current cursor position: row and column numbers
content     - string: the current display content

Note: row and column numbering begin at 0. A display’s origin is
row 0, column 0.

If a text display element supports more than the mandatory U+0000 ->
U+00ff symbol set, it shall respond to an Audit query of the
supported character sets by providing the high order octet plus the
high order bit of the lower octet of each supported character set.

For example, if the text display element supports U+2500 ->U+25ff,
U+2600 ->U+26ff and U+2700 -> U+277f, it would return "250, 258,
260, 268, 270" in cdpgs.

3.6.2. Events
3.6.2.1. Event Configuration
None.

3.6.2.2. Observed Event
None.

3.6.3. Signals
3.6.3.1. Display

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Short name: disp

This is a text display signal.

Signal Parameters

    row           - integer
    column        - integer
    str           - string
    attribute     - string (OR of blink, invert, underline)
         example: "attribute=invert"
         example: "attribute=blink+underline" (OR’ing of
    attributes)

Note 1: Text will be inserted beginning at the row and column given
in the signal parameters. If no row and column parameters are
given, the text will be inserted starting at the current cursor
position. The current cursor position will always be advanced to
the position immediately after the last character inserted.

Note 2: The attribute will apply to all characters contained in the
signal. If no attribute is provided, plain text will be displayed.
To turn on an attribute in the middle of a string, one would send a
signal with a beginning sub-string of plain text, follow by a signal
with the desired attribute(s) for the middle sub-string, and
finishing with the signal containing the remaining sub-string of
plain text.

Note 3: A string will not word wrap to the next row. If a string
cannot fit into the current row, it will be truncated without warning.

3.6.3.2 Clear Display

Short name: clDisp

This signal clears the entire display and resets the current cursor position to the origin (row 0, column 0).

Signal Parameters:

None.

3.6.4 Statistics

None.

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3.7  Softkey Package

Short name: skey

Softkeys are a combination of a function key and a display element, sharing some behavior of each. Softkeys are dynamically configured by the MGC based on the current state and context of the application controlling the IP Phone MG.

Softkey identifiers are indexed 1,2...N. N is the maximum number of softkeys supported by a specific IP Phone MG.

3.7.1. Gateway Property Audit

Possible values: Returns a list of Softkeys
softKeyList = (numberOfSoftkeys, displaySize, supportedCharSet, softkey *(,softkey))

numberOfSoftkeys  = integer
displaySize       = integer ; number of characters
supportedCharSet  = Unicode character sets supported
softkey           = (nameStr, displayContent)
nameStr           = character string
displayContent    = Unicode character string

3.7.2. Events

3.7.2.1. Event Configuration

None.

3.7.2.2. Observed Events

3.7.2.2.1 Key Down

Short name: keyDown

Event Parameters:

softkeyId    integer
3.7.2.2.2. Key Up

Short name: keyUp

Event Parameters

- nameStr: 'C' string UTF-8 characters
- duration: softkey press duration in milliseconds

3.7.3. Signals

3.7.3.1. Set Name

Softkey mapping command:

Short name: setName

Signal Parameters:

- softkeyId: integer
- nameStr: 'C' string, 8-bit UTF-8 encoding

Note:SetName with a null string clears the softkey, i.e. the softkey becomes blank and inactive.

3.7.3.2. Display

Softkey control command that sets softkey display text.

Short name: display

Signal Parameters:

- softkeyId: integer
- row: integer
- column: integer
- str: 'C' string, 8-bit UTF-8 encoding
- attribute: OR of blink, invert (TBD)

{{Add nameStr parameter, to allow Display by SK name? Could also be separate command, eg. DisplayByName(). Same issue as in Indicator. }}

[[ Note: Should consider color (foreground and background) here. Left for further study. ]]

3.7.4. Statistics

3.8 Trunk Generic

3.8.1 Trunk Generic Package

Short name: trunkgen

The Trunk Generic package groups non-specialised events and signals for trunk lines. Those can be used with ISUP (ITU Q.764), TUP (ITU Q.724) and CAS (e.g. R2:ITU Q.400 to Q.490).
3.8.2 Gateway Properties audit

3.8.3 Events

3.8.3.1 Event Configuration

3.8.3.1.1 Modem Detected

Short name: modem

Signals the detection of a modem signal on the termination.

Configuration Parameters:

streamid       Id of the audio stream to perform the test on.

3.8.3.1.2 Fax Tone Detected

Short name: faxtone

Signals the detection of a fax tone on the termination.

Configuration Parameters:

streamid       Id of the audio stream to perform the test on.

3.8.3.1.3 Report Failure

Short name: repfail

Signals on the termination the detection of a failure due to external or internal (in the Media Gateway) reasons.

Configuration Parameters:

streamid       Id of the audio stream to report failure on.

3.8.3.2 Observed Events

3.8.3.2.1 Modem Detected

Short name: modem

Event Parameters:

none

3.8.3.2.2 Fax Tone Detected

Short name: faxtone

Event Parameters:

None

3.8.3.2.3 Report Failure

Short name: repfail

Event Parameters:

Error code       2 bytes describing the failure reason

Default: 0000 (internal error)

3.8.4 Signals

3.8.4.1 Busy tone
Short name: btone

Play busy tone if the called side is busy as given in E.180.

Signal Parameters:
streamid  id of the audio stream to play the signal on.

3.8.4.2 Ringing Tone (timeout)
Short name: ringing

A tone advising the caller that a connection has been made and that a calling signal is being applied to a telephone number or service point. (See ITU Rec. E.180 and E.182)

Signal Parameters:
streamid  id of the audio stream to play the signal on.
Duration  ringing tone duration in seconds

3.8.4.3 Congestion Tone (timeout)
Short name: congestion

A tone advising the caller that the groups of lines or switching equipment necessary for the setting-up of the required call or for the use of a specific service are temporarily engaged. (See ITU Rec. E.180 and E.182)

Signal Parameters:
streamid  id of the audio stream to play the signal on.
duration  timeout duration in seconds.

3.8.5 Statistic
3.8.5.1 Statistic Request
   none
3.8.5.2 Statistic Report
   None

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3.9 Trunk Supplementary
3.9.1 Trunk Supplementary Package

Short name: trunksupp

This package is used to handle events and signals on trunking terminations reaching the Media Gateway from the PSTN network.

3.9.2 Gateway Properties audit

3.9.3 Events
3.9.3.1 Event Configuration
3.9.3.1.1 Continuity Test

Short name: conttest
This event awaits the reception of the return tone, according to ITU G.724, in the process of a continuity test.
Configuration Parameters:
streamid     Id of the audio stream to perform the test on.

3.9.3.2 Observed Events
3.9.3.2.1 Continuity Test

Short name: conttest

Event Parameters:
Indication           "SUCCESS", "NO SUCCESS" according to ITU Q.724/Q.764.

3.9.4 Signals
3.9.4.1 Continuity Tone (on/off)

Short name: conttone
Play a continuity tone as part of a requested continuity test as given in ITU Q.724. Both a single tone test and a dual tone test are supported. This signal should be used together with the conttest event.

Signal Parameters:
streamid     id of the audio stream to perform the test on
testtype     "single" for single tone test
            "dual" for dual tone test

3.9.5 Statistic
3.9.5.1 Statistic Request
none
3.9.5.2 Statistic Report
none

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3.10 NAS
3.10.1 NAS Package

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Short name: nas

This package supports the functionality of a Media Gateway as NAS (Network Access Server). This encompasses the support of dial-in access to the NAS, but not the contact to a AAA server for authentication, authorisation etc and the possible subsequent set-up of a layer 2 tunnel to a remote NAS. Those are autonomous functions of a NAS and therefore out of scope for the Megaco protocol (see e.g. IETF RFC 2661 (L2TP) and RFC 1661 (PPP)).

3.10.2 Gateway Properties audit
3.10.3 Events
3.10.3.1 Event Configuration
3.10.3.1.1 Report Failure
Short name: repfail

Signals on the termination the detection of a failure due to external or internal (in the Media Gateway) reasons.

Configuration Parameters:

streamid     Id of the stream to report failure on.
3.10.3.1.2 Authorisation succeeded

Short name: authsuc

This event signals that authorisation by the AAA server for the requested service was successful (see for example IETF RFC 2138 (RADIUS)).

Configuration Parameters:

* streamid: Id of the stream to report on.

3.10.3.1.3 Authorisation denied

Short name: authden

This event signals that authorisation by the AAA server for the requested service was denied (see for example IETF RFC 2138 (RADIUS)).

Configuration Parameters:

* streamid: Id of the stream to report on.

3.10.3.1.4 Call back Request

Short name: cbr

The call back event is used to notify that a call-back has been requested by the AAA server during the initial phase of a data connection (see IETF RFC 2138 (RADIUS)). The event report includes the identification of the user to be called back, e.g. E.164 number.

Configuration Parameters:

* streamid: Id of the stream on which to look for the request.

3.10.3.1.5 Authentication Authorisation and Accounting (AAA) Failure

Short name: aaafail

Used to signal failure of the AAA server.

Configuration Parameters:

* streamid: Id of the stream to check for failure.

3.10.3.2 Observed Events

3.10.3.2.1 Report Failure

Short name: repfail

Event Parameters:

* Error code: 2 bytes describing the failure reason
  Default: 0000 (internal error)

3.10.3.2.2 Authorisation succeeded

Short name: authsuc
Event Parameters:
none
3.10.3.2.3 Authorisation denied

Short name: authden

Event Parameters:
none
3.10.3.2.4 Authentication Authorization and Accounting (AAA) Failure

Short name: aaafail

Event Parameters:
Error code   2 bytes describing the failure reason
            Default: 0000 (internal error)

3.10.4 Signals
3.10.5 Statistic
3.10.5.1 Statistic Request

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none
3.10.5.2 Statistic Report
none

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3.11 RTP
3.11.1 RTP Package
Short name: rtp

This package is used to support packet based multimedia data
transfer by means of the Real-time Transport Protocol (RTP).
3.11.2 Gateway Properties audit
3.11.2.1 Timestamps
Short name: timest

Describes the time units.

Possible values:
milliseconds
minutes

3.11.3 Events
3.11.3.1 Event Configuration
3.11.3.1.1 Report Failure
Short name: repfail

Signals on the termination the detection of a failure due to
external or internal (in the Media Gateway) reasons.

Configuration Parameters:

streamid     Id of the audio stream to report failure on.

3.11.3.1.2 Quality Alert
Short name: qualert

Alerts the MGC in case jitter, delay or the rate of packet loss
exceed given threshold values. See IETF RFC 1889 for a definition of
those terms.

Configuration Parameters:
streamid     Id of the audio stream to perform the test on.

packet loss  packet loss threshold value (as percentage)
jitter       jitter threshold value in timestamp units.
delay        packet propagation delay measured in timestamp units.

3.11.3.2 Observed Events
3.11.3.2.1 Report Failure

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Short name: repfail

Event Parameters:

Error code   2 bytes describing the failure reason
Default: 0000 (internal error)

3.11.3.2.2 Quality Alert

Short name: qualert

Event Parameters:
packet loss  measured value of packet loss (as percentage)
jitter       measured interarrival jitter (in timestamp units)
delay        packet propagation delay measured in timestamp units.

3.11.4 Signals

3.11.5 Statistic
3.11.5.1 Statistic Request
3.11.5.1.1 Packet Loss

Short name: pl

Describes the current rate of packet loss on an RTP stream, as defined in IETF RFC 1889. Packet loss is expressed as percentage value: number of packets lost in the interval between two reception reports, divided by the number of packets expected during that interval.

Request parameters: RTP stream ID.

3.11.5.1.2 Jitter

Short name: jitter

Requests the current value of the interarrival jitter on an RTP stream as defined in IETF RFC 1889. Jitter measures the variation in interarrival time for RTP data packets.

Request parameters: RTP stream ID.

3.11.5.1.3 Delay

Short name: delay

Requests the current value of packet propagation delay expressed in
3.11.5.2 Statistic Report
3.11.5.2.1 Packet Loss

Short name: pl
Possible values: percentage value of packets lost on this stream.

3.11.5.2.2 Jitter

Short name: jitter
Possible values: interarrival jitter measured in timestamp units.

3.11.5.2.3 Delay

Short name: delay
Possible values: packet propagation delay measured in timestamp units.

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3.12 Announcement
3.12.1 Announcement Server Package

Short name: ann
This package supports announcement functionality at a Media Gateway.

3.12.2 Gateway Properties audit
3.12.3 Events
3.12.3.1 Event Configuration
3.12.3.1.1 Announcement completed

Short name: anncomp
3.12.3.1.2 Announcement Failure

Short name: annfail
Configuration Parameters:

streamid   Id of the concerned audio stream.

3.12.3.2 Observed Events
3.12.3.2.1 Announcement Failure

Short name: annfail
Event Parameters:

Error code    2 bytes describing the failure reason
Default: 0000 (internal error)
3.12.3.2.2 Announcement completed

Short name: anncomp

3.12.4 Signals
3.12.4.1 Announcement Play

Short name: annplay
Play an announcement

Signal Parameters:
- `streamId`: id of the audio stream to play an announcement on
- `type`: choice from an announcement list
- `params`: announcement parameters (e.g. specific numbers)

3.12.5 Statistic
3.12.5.1 Statistic Request
none
3.12.5.2 Statistic Report
none

4. References

[] CCITT Recommendation E.180/Q.35 Technical characteristics of tones for the telephone service (03/98)
[] CCITT Recommendation E.182 Application of tones and recorded announcements in telephone services (03/98)
[] CCITT Recommendation Q.115 (06/97) Logic for the control of echo control devices
[] CCITT Recommendations Q.400 to Q.490 (1988), Specifications of Signalling System R2.
[] IETF RFC 1661: Simpson, W., The Point-to-Point Protocol (PPP), July 1994

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