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Source: **Siemens**
Title: **Proposal for H.323 Call Diversion**
Purpose: **Proposal for discussion**

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Overview

This contribution contains proposals about how call diversion supplementary service could be implemented to H.323. It includes description of the service and for message flow scenarios based on QSIG Call Diversion supplementary service.

1 Call diversion

1.1 Service description

1.1.1 General

Call diversion is a supplementary service which applies during call establishment providing a forwarding of an incoming call to another destination.It permits the forwarding user to send all or specific incoming calls to another number. Before a diversion can take place, call forwarding must be activated in the forwarding terminal.Call forwarding may be either permanently activated or activated /deactivated under user control. This can be done locally by programming the terminal or from remote.

To support supplementary services on H.323, the sequences are based on QSIG principles, which can be implemented on top of H.225.

1.1.2 Call forwarding conditions

Depending on the type of forwarding, the call forwarding is activated on certain conditions:

- call forwarding Unconditional

All calls are diverted immediately.

- call forwarding Busy

Calls are automatically immediately diverted if forwarding-user is busy.

- call forwarding No reply

Calls are diverted, when no answer was received within a predefined period of time.

- call Deflection

Call deflection is initiated at the discretion of the forwarding user.

A network option distinguishes two cases of call retention on the forwarding terminal:

- early release (the forwarding terminal releases the call towards the calling terminal on acceptance of the call forwarding acknowledgement)

- late release (the call is retained until alerting commences at the forwarded-to terminal)

1.1.3 User perspectives

There are various ways how forwarding may take place:

- forwarding with rerouting:

After receiving setup the forwarding terminal sends a Facility message to the calling terminal containing the address of the forwarded-to terminal. The calling terminal then establishes a connection to the forwarded-to terminal.

- forwarding with forward switching:

After receiving setup the forwarding terminal sends a setup message to the forwarded-to terminal and joins the connections to the calling and the forwarded-to terminal.

Depending on the indicated calling terminal capabilities the forwarding terminal decides which scenario to use (1.2 forwarding-terminal decision).

1.1.4 Gateway

For the interworking between networks supplying call forwarding on top of H.323 and other networks (e.g. N-ISDN based networks) a gateway may be used. To forward calls from the other network, the rerouting function of call forwarding might be performed by the gateway.

1.1.5 Differences to QSIG

In QSIG the signalling for the call transfer supplementary service is done by network components. In H.323 environment this functionality should be in the terminals.

1.1.6 H.323-SplS-terminal

H.323-SplS-terminal is a terminal, which can support QSIG supplementary services based on H.225 described in this document.

1.2 Forwarding-terminal decision

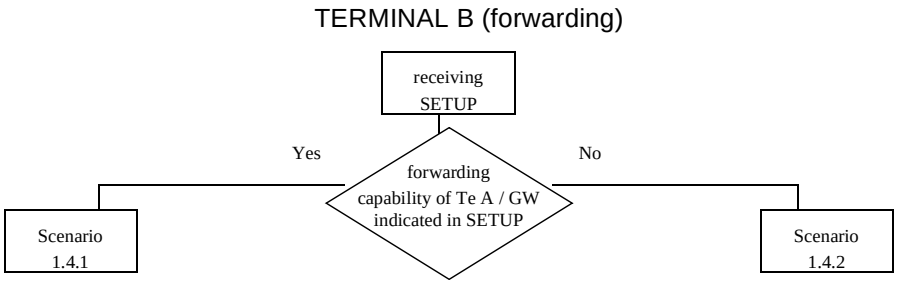

Figure 6 -1 Forwarding terminal decision

1.3 Activation of call forwarding

1.3.1 Local activation of call forwarding

Internal procedure within terminal: User input: forwarded-to-number (select condition; set timer value, if required)

1.3.2 Remote activation of call forwarding in Terminal

1.3.2.1 Operational model

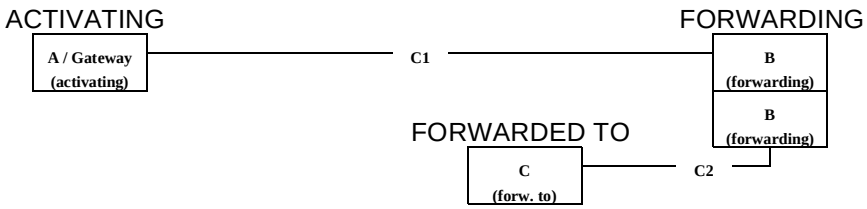

Figure 6 -2 Operational model for activation of forwarding

Table 6 - 1 activation of forwarding

Row no.	User / Application action	H.323 API	Note	IP, H.225, QSIG, CSTA, H.245	Note	H.323 API	User / Application action
1	**MM Terminal A / Gateway**			**Network**		**MM Terminal B**	
2	invoke activation of CF in Te B	⇓ **H.323 API** <Make_call-request> - User A address		H.225 <SETUP> → Facility IE: invoke Q.952: activateDiversion procedure=CFU(1) e. g. forwardedToAddress=address C servedUserNr		⇑ **H.323 API** Make_call_indication	Receive request for activation of CT
3	**MM Terminal B**			**Network**		**MM Terminal C**	
4	check restriction on Te C	⇓ **H.323 API** <Make_call-request> - User A address		H.225 <SETUP> → Facility IE: invoke QSIG: checkRestriction activationStatus notificationDiv		⇑ **H.323 API** Make_call_indication	Receive restriction check check restrictions
5	activate CF	⇑ **H.323 API** <Make_call_confirm>		H.225 <CONNECT> (Facility?) ← Facility IE: returnResult QSIG: checkRestriction		⇓ **H.323 API** Make_call_response	send result of restriction check
6	**MM Terminal A / Gateway**			**Network**		**MM Terminal B**	
7	activation indication to user	⇑ **H.323 API** <Make_call_confirm> (address C)		H.225 <CONNECT> (Facility?) ← Facility IE: returnResult QSIG: activateDiversion procedure=CFU(1) forwardedToAddress=address C servedUserNr		⇓ **H.323 API** Make_call_response	accept activation of CF activation indication to user
8	**MM Terminal B**			**Network**		**MM Terminal C**	

Figure 6 -2 Operational model for activation of forwarding

Table 6 - 1 activation of forwarding

Row no.	User / Application action	H.323 API	Note	IP, H.225, QSIG, CSTA, H.245	Note	H.323 API	User / Application action
9		⇑ **H.323 API** Clear_call_confirm (BC state active=> BC state idle)		H.225 <RELEASE COMPLETE> ⟶		⇑ **H.323 API** Clear_call_indication	Receive H.225 release_indication
10	**MM Terminal B**			**Network**			**MM Terminal A / Gateway**
11		⇑ **H.323 API** Clear_call_confirm (BC state active=> BC state idle)		H.225 <RELEASE COMPLETE> ⟶		⇑ **H.323 API** Clear_call_indication	Receive H.225 release_indication

1.4 Scenarios without gatekeeper

1.4.1 **Call forwarding with rerouting** (A is a H.323-SplS-terminal, or gateway of A is able to forward calls)

1.4.1.1 For conditions: unconditional, on busy, deflection-early release

1.4.1.1.1 **Operational model**

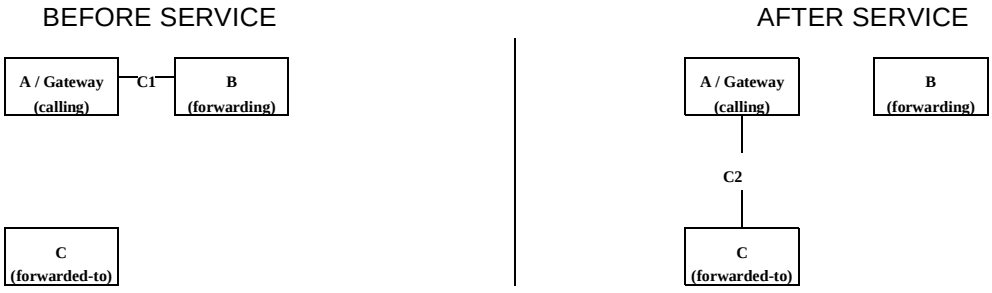

Figure 6 -3 Operational model for call forwarding with rerouting

1.4.1.1.2 **Description from user point of view:**

User A (calling party): calling B; receives notification of forwarding; communicating with C

User B (forwarding party): not present

User C (forwarded to party): idle; receives notification of incoming call (forwarded); accepts call; confirmes media; communicating with A

Table 6 - 2 Call forwarding with rerouting (unconditional, on busy, deflection-early release[1])

Row no.	User / Application action	H.323 API	Note	IP, H.225, QSIG, CSTA, H.245	Note	H.323 API	User / Application action
12	**MM Terminal A / Gateway**			**Network**		**MM Terminal B**	
13	Request for call establishment to User B. Select Media User B address	⇓ **H.323 API** <Make_call-request> - User B address; - Media - Bandwidth		H.225 <SETUP> →		⇑ **H.323 API** Make_call_indication	Receive H.225 setup_indication
14		⇑ **H.323 API** Alerting indication	2	H.225 <ALERTING> ←		⇓ **H.323 API** Alerting request	Start user alerting
15							condition: -unconditional -timer (busy) expires -user deflection
16	Receive forwarding request			H.225 <FACILITY> ← Facility IE: invoke QSIG: callRerouting reroutingReason=cfu(1); cfb(2); cd(4) calledAddress=address C			Request terminal A to call terminal C
17	Acceptance of forwarding			H.225 <FACILITY> → Facility IE: returnResult QSIG: callRerouting reroutingReason=cfu(1); cfb(2); cd(4) calledAddress=address C			
18		⇑ **H.323 API** Clear_call_confirm (BC state active=> BC state idle)		H.225 <RELEASE COMPLETE> →		⇑ **H.323 API** Clear_call_indication	Receive H.225 release_indication
19	**MM Terminal A / Gateway**			**Network**		**MM Terminal C**	
20	Request for call establishment to User C Select Media User C address	⇓ **H.323 API** <Make_call-request> - User C address; - Media - Bandwidth		H.225 <SETUP> → Facility IE: invoke QSIG: divertingLegInformation2		⇑ **H.323 API** Make_call_indication	Receive H.225 setup_indication diversion indication

Table 6 - 2 Call forwarding with rerouting (unconditional, on busy, deflection-early release[1])

Row no.	User / Application action	H.323 API	Note	IP, H.225, QSIG, CSTA, H.245	Note	H.323 API	User / Application action
2[1]	Indication to Appl/ User A of MM Terminal C general availability Indication of diverted-to-number	⇑ **H.323 API** <Make_call_confirm> (address C)		H.225 <CONNECT> ◄ Facility IE: invoke QSIG: divertingLegInformation3		⇓ **H.323 API** Make_call_response	Call accept by User C or by Application C

1early release and late release are network options for the call deflection supplementary service (Q.952, table 2)
2only for condition: deflection-early release

1.4.1.2 For condition: no reply; deflection-late release

1.4.1.2.1 Operational model

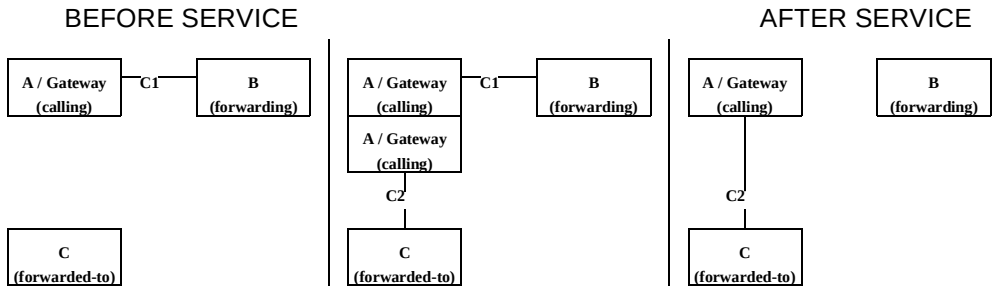

Figure 6 -4 Operational model for call forwarding with rerouting

1.4.1.2.2 Description from user point of view:

User A (calling party): calling B; alerting; waiting for reply; receives notification of forwarding; communicating with C

User B (forwarding party): receives notification of incoming call; alerting; does not reply

User C (forwarded to party): idle; receives notification of incoming call (forwarded); accepts call; confirmes media; communicating with A

Table 6 - 3 Call forwarding with rerouting (no reply; deflection-late release[1])

Row no.	User / Application action	H.323 API	Note	IP, H.225, QSIG, CSTA, H.245	Note	H.323 API	User / Application action
22	**MM Terminal A / Gateway**			**Network**		**MM Terminal B**	
23	Request for call establishment to User B. Select Media User B address	⇓ **H.323 API** <Make_call-request> - User B address; - Media - Bandwidth		H.225 <SETUP> →		⇑ **H.323 API** Make_call_indication	Receive H.225 setup_indication
24		⇑ **H.323 API** Alerting indication		H.225 <ALERTING> ←		⇓ **H.323 API** Alerting request	Start user alerting
25							timer (no reply) expires user deflection
26	Receive H.225 forwardingRequest			H.225 <FACILITY> ← Facility IE: invoke QSIG: callRerouting reroutingReason=cfu(1); cfb(2); cd(4) calledAddress=address C			Request terminal A to call terminal C
27	Acceptance of forwarding			H.225: <FACILITY> → Facility IE: returnResult QSIG: callRerouting reroutingReason=cfu(1); cfb(2); cd(4)			
28	**MM Terminal A / Gateway**			**Network**		**MM Terminal C**	
29	Request for call establishment to User C Select Media User C address	⇓ **H.323 API** <Make_call-request> - User C address; - Media - Bandwidth		H.225 <SETUP> → Facility IE: invoke QSIG: divertingLegInformation2		⇑ **H.323 API** Make_call_indication	Receive H.225 setup_indication diversion indication
30	Case 1: Successful forwarding (user B did not reply during forwarding)						
31		⇑ **H.323 API** Alerting indication	2	H.225 <ALERTING> ←		⇓ **H.323 API** Alerting request	Start user alerting
32	**MM Terminal A / Gateway**			**Network**		**MM Terminal B**	
33		⇑ **H.323 API** Clear_call_confirm (BC state active=> BC state idle)		H.225 <RELEASE COMPLETE> →		⇑ **H.323 API** Clear_call_indication	Receive H.225 release_indication
34	**MM Terminal A / Gateway**			**Network**		**MM Terminal C**	

Table 6 - 3 Call forwarding with rerouting (no reply; deflection-late release[1])

Row no.	User / Application action	H.323 API	Note	IP, H.225, QSIG, CSTA, H.245	Note	H.323 API	User / Application action
35	Indication to Appl/ User A of MM Terminal C general availability Indication of diverted-to-number	⇑ **H.323 API** <Make_call_confirm> (address C)	3	H.225 <CONNECT> ◄ Facility IE: invoke QSIG: divertingLegInformation3		⇓ **H.323 API** Make_call_response	Call accept by User C or by Application C
36	Case 2: User B replies before alerting of user C						
37	**MM Terminal A / Gateway**			**Network**		**MM Terminal B**	
38	Indication to Appl/ User A of MM Terminal C general availability	⇑ **H.323 API** <Make_call_confirm> (address C)		H.225 <CONNECT> ◄		⇓ **H.323 API** Make_call_response	Call accept by User C or by Application C
39	**MM Terminal A / Gateway**			**Network**		**MM Terminal C**	
40		⇑ **H.323 API** Clear_call_confirm (BC state active=> BC state idle)		H.225 <RELEASE COMPLETE> ►		⇑ **H.323 API** Clear_call_indication	Receive H.225 release_indication
41	Case 3: Call establishment to terminal C fails						
42	**MM Terminal A / Gateway**			**Network**		**MM Terminal C**	
43	Receive H.225 release_indication	⇑ **H.323 API** Clear_call_indication		H.225 <RELEASE COMPLETE> ◄		⇑ **H.323 API** Clear_call_confirm (BC state active=> BC state idle)	
44	**MM Terminal A / Gateway**			**Network**		**MM Terminal B**	
45		⇑ **H.323 API** Clear_call_confirm (BC state active=> BC state idle)		H.225 <RELEASE COMPLETE> ►		⇑ **H.323 API** Clear_call_indication	Receive H.225 release_indication

1early release and late release are network options for the call deflection supplementary service (Q.952, table 2)
2Connect could also be
3If not already sent

1.4.2 **Call forwarding with forward switching** (for all conditions; only B has to be a H.323-SplS-terminal)

1.4.2.1 Operational model

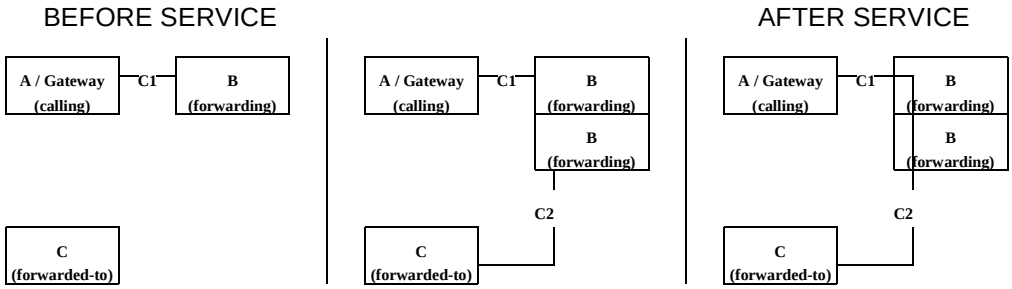

Figure 6 -5 Operational model for call forwarding with forward switching

1.4.2.2 Description from user point of view:

User A (calling party): calling B; receives notification of forwarding;

communicating with C

User B (forwarding party): not present

User C (forwarded to party): idle; receives notification of incoming call; accepts call; confirmes media;

communicating with A

Table 6 - 4 call forwarding with forward switching

Row no.	User / Application action	H.323 API	Note	IP, H.225, QSIG, CSTA, H.245	Note	H.323 API	User / Application action
46	**MM Terminal A / Gateway**			**Network**		**MM Terminal B**	
47	Request for call establishment to User B. Select Media User B address	⇓ **H.323 API** <Make_call-request> - User B address; - Media - Bandwidth		H.225 <SETUP> →		⇑ **H.323 API** Make_call_indication	Receive H.225 setup_indication
48		⇑ **H.323 API** Alerting indication	1	H.225 <ALERTING> ←		⇓ **H.323 API** Alerting request	Start user alerting
49							condition: -unconditional -busy -timer (no reply) expires -user deflection

Table 6 - 4 call forwarding with forward switching

Row no.	User / Application action	H.323 API	Note	IP, H.225, QSIG, CSTA, H.245	Note	H.323 API	User / Application action
50	indication of forwarding		2	H.225 <FACILITY> ← Facility IE: invoke divertingLegInformation1 Interpretation Apdu=discardAny UnrecognisedInvokePdu			Send indication (stops timers)
51	**MM Terminal B**			**Network**		**MM Terminal C**	
52	Request for call establishment to User C Select Media User C address	⇓ **H.323 API** <Make_call-request> - User C address; - Media - Bandwidth		H.225 <SETUP> → Facility IE: invoke divertingLegInformation2 Interpretation Apdu=discardAny UnrecognisedInvokePdu		⇑ **H.323 API** Make_call_indication	Receive H.225 setup_indication diversion indication
53	Indication to Appl/ User B of MM Terminal C general availability	⇑ **H.323 API** <Make_call_confirm> (address C)		H.225 <CONNECT> ←		⇓ **H.323 API** Make_call_response	Call accept by User C or by Application C
54	**MM Terminal A / Gateway**			**Network**		**MM Terminal B**	
55	Indication to Appl/ User A of MM Terminal B general availability	⇑ **H.323 API** <Make_call_confirm> (address C)		H.225 <CONNECT> ←		⇓ **H.323 API** Make_call_response	Call accept by User B or by Application B
56					3		Join connetion to A with connection to C
57	**MM Terminal A / Gateway**			**Network**		**MM Terminal C**	
58	Indication of diverted-to-number			H.225 <FACILITY> ← Facility IE: returnResult divertingLegInformation3 Interpretation Apdu=discardAny UnrecognisedInvokePdu			

1only for conditions: deflection and no reply
2Send facility after Setup to Te C?
3Te B must be sure, that Te A is allowed to talk to Te C