

VegaStream

Information Note

Vega H.323 messaging



This document provides an introduction to H.323 messaging, highlighting how Vega configuration affects the contents of the messages sent.

- [H.323 Registration](#)
- [H.323 General call flow](#)

Also it provides details on what features are supported and which features are not supported in Vega code.

- [Supported features](#)
- [Unsupported features](#)

Also other useful information

- [Audio connection times](#)
- [RTCP](#)

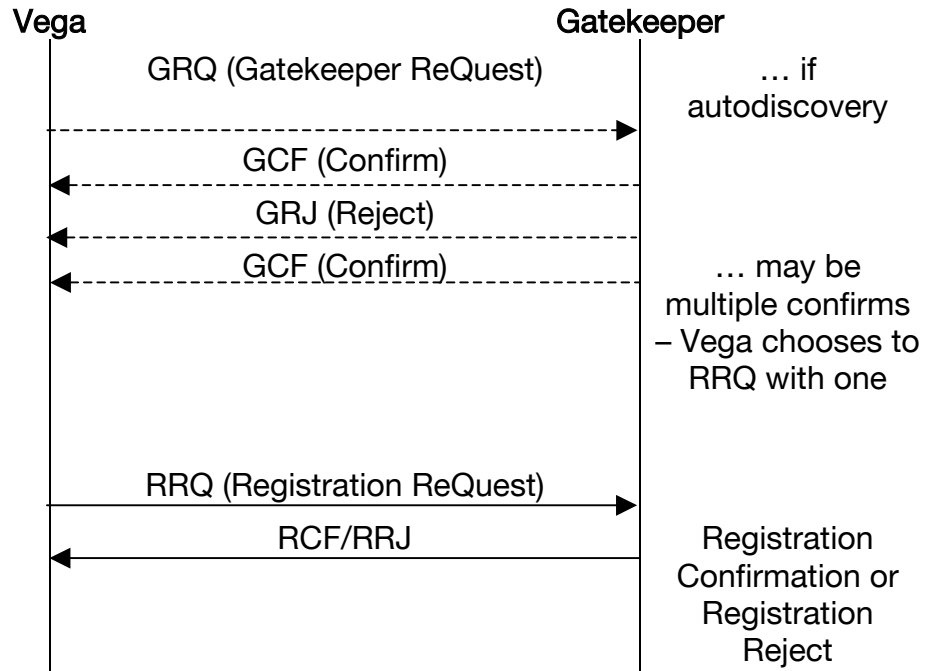
Reference information:

- ITU-T H.323
- RFC 1889 - RTP / RTCP

H.323 Introduction

H.323 signaling messages are sent over TCP, and RTP media packets are sent using UDP.

H.323 Registration




If the Vega is set up for gatekeeper mode, then all calls query the gatekeeper. It is not possible to route some calls via the gatekeeper and some directly.

Note:

1. There are 2 methods for gatekeeper discovery, either manual or automatic. If manual the Vega will use the `h323.gatekeeper.default_gatekeeper` IP address (port number 1719) – if the `h323.gatekeeper.auto_discover=1` then automatic mode is used, the Vega will multicast the GRQ to IP address 224.0.1.41 port number 1718.
2. In the RRQ, as well as sending the Terminal Alias, the Vega will also automatically send details about which prefixes the Vega Dial Planner has been configured to support, i.e. for every dial plan containing a TEL: entry of the form TEL:abc.* the vega will send the abc digits in the RRQ section:

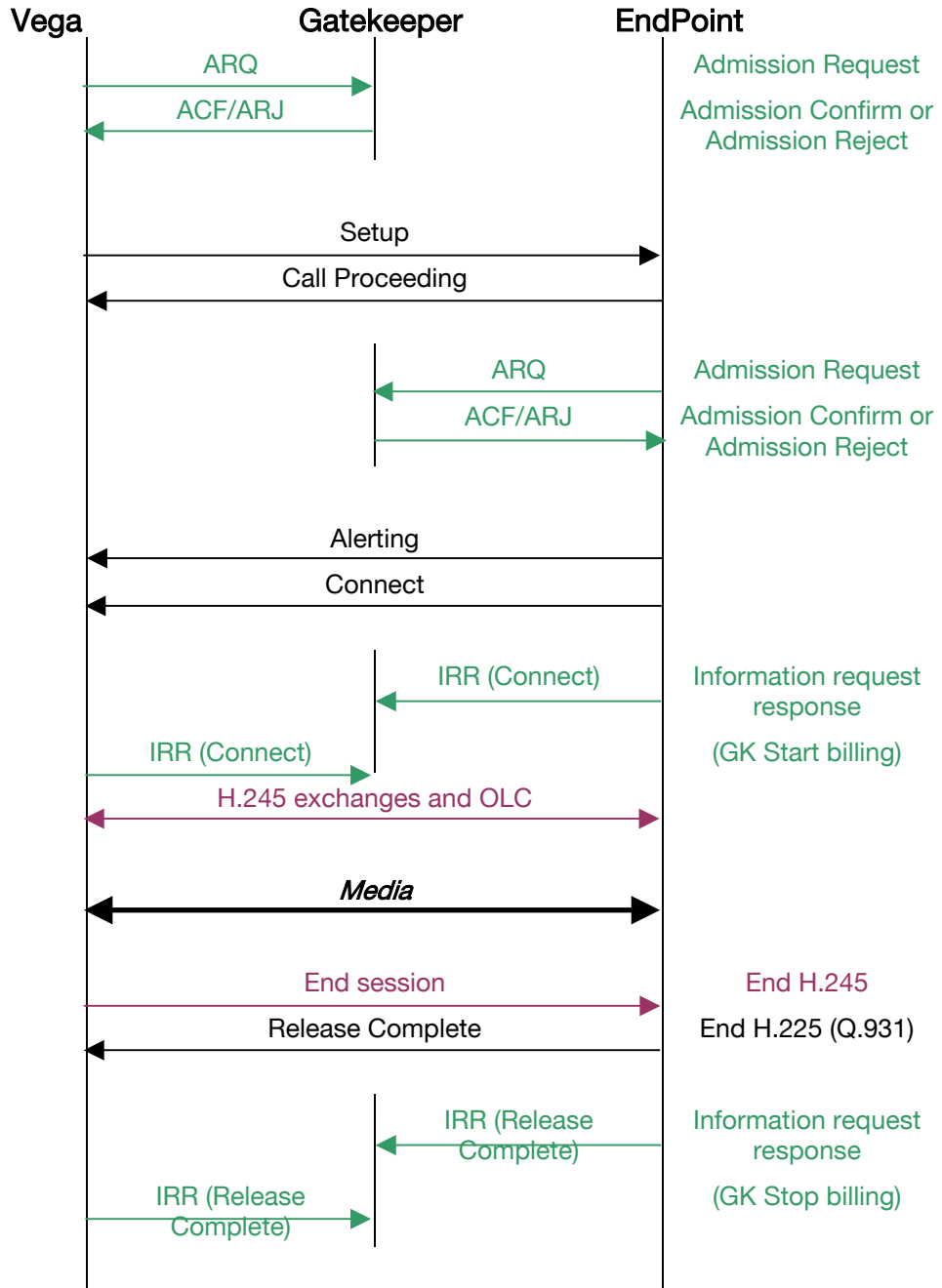
terminal type
gateway
protocol
voice
supportedPrefixes
e164 address

The Terminal Alias is sent in the RRQ section:
[terminal alias](#)

3.  In Registration RRQ messages the Vega will report:
- t35CountryCode 0xB4 (UK)
 - manufacturerCode 0x5600 (assigned to VegaStream)
 - ProductId eg **VS5:R** (hardware identification)
 - VersionId eg 04.01.05aT001 (software version)

H.323 General call flow

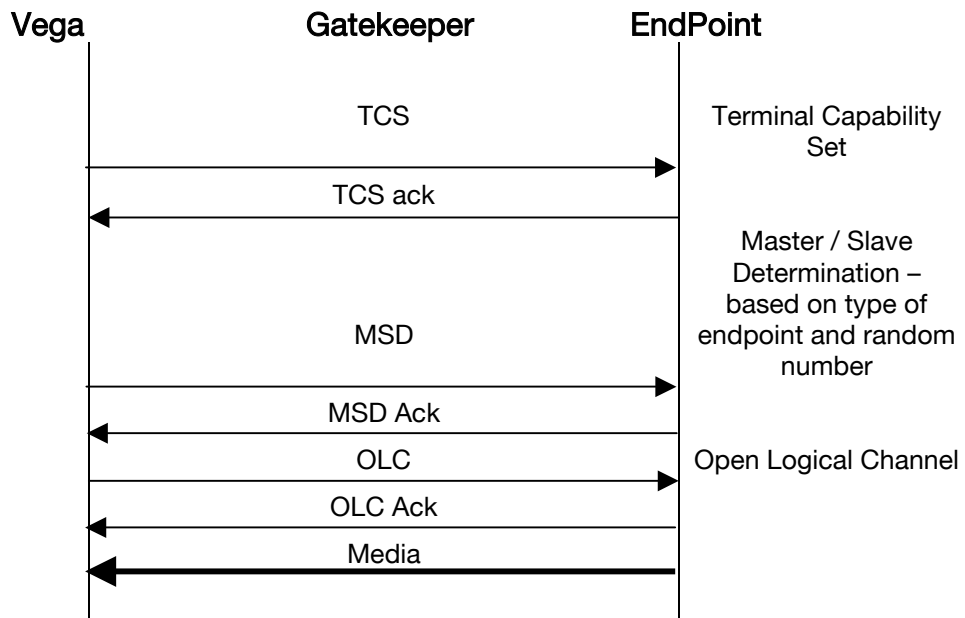
Non faststart with gatekeeper Admission Request and Information Request Response:



This ladder diagram shows direct endpoint signaling (rather than having signaling messages routed – proxy'd – via the gatekeeper).

H.225 carries the Q.931 messages.

H.245 handles the Master Slave Determination, Terminal Capabilities Set and Open Logical Connection



These H.245 messages occur from each gateway to the other, so there is a TCS in each direction, a TCS ack in each direction etc. In traces the H.245 messaging from the two endpoints is seen interspersed with each other.

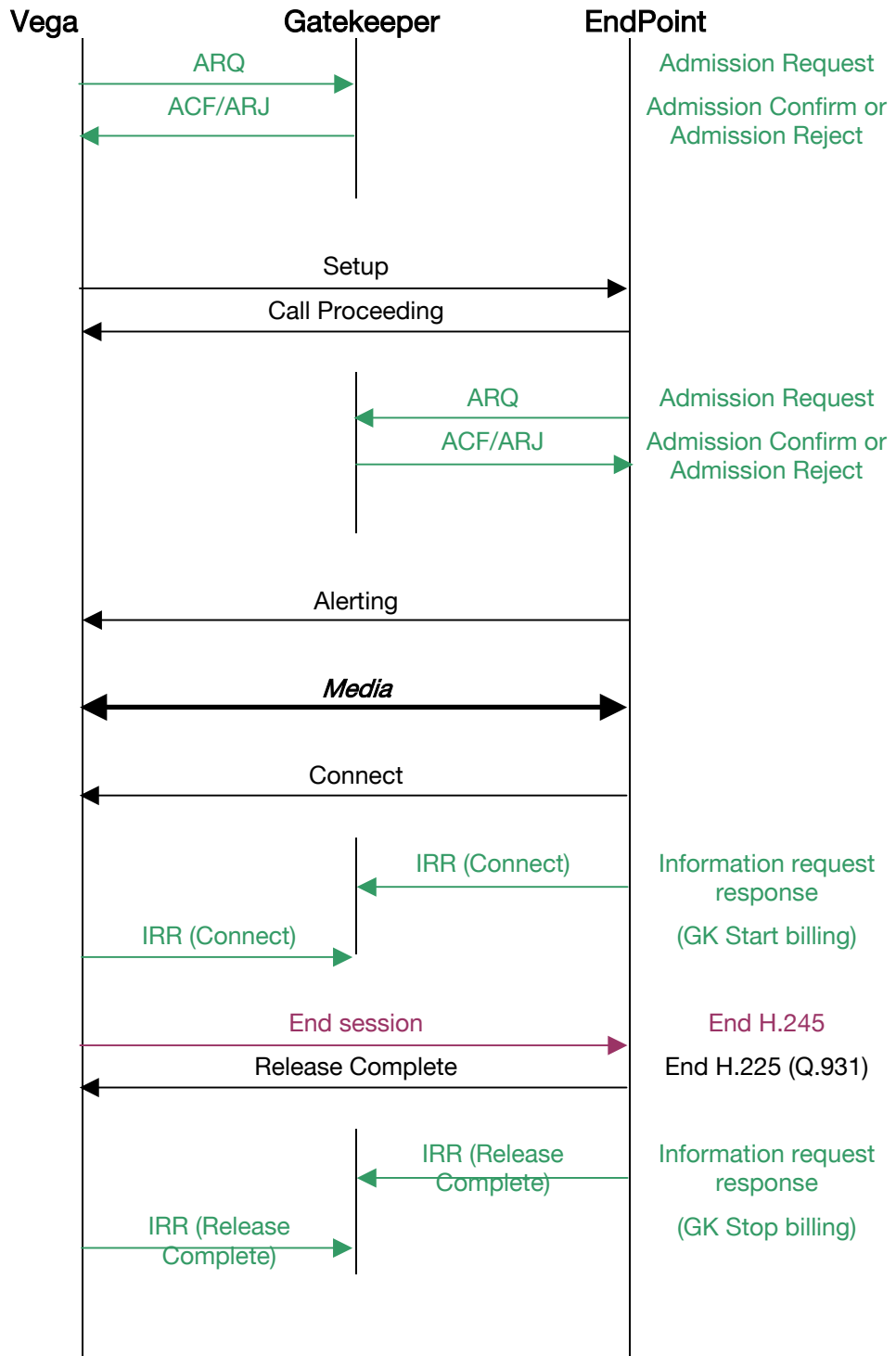
The time that the H.245 interactions occur depends upon the configuration of the system, specifically whether faststart is enabled or not and whether early_h.245 is enabled or not. If early_h.245 is enabled then the TCS etc. negotiation may occur after the SETUP – otherwise it occurs after the connect.

If faststart is enabled then the setup message includes the OLC details so that the logical channel may be opened early to allow media through earlier. When the Vega will accept the faststart request that is sent to it (and allow the audio channel to be opened) can be configured using the accept_fast_start parameter, 1 = after Connect and 2 = after Alerting.

Although faststart allows the codecs to be negotiated within the H.323 messaging the H.245 negotiations are still actioned afterwards in order to ensure that there is a signaling link available to carry any out of band DTMF messages or codec change requests (e.g. used when converting a voice call to a T.38 fax call).

Pkt ID	Pkt Size	Time	Source IP	Destination IP	Protocol	Message
37	206	13:23:52.068969	65.218.172.132	12.232.61.120	Q931	Setup
38	113	13:23:52.139070	12.232.61.120	65.218.172.132	Q931	Alerting
41	149	13:23:53.841518	12.232.61.120	65.218.172.132	Q931	Connect
45	117	13:23:54.101892	65.218.172.132	12.232.61.120	H245	Req-TermCapSet
46	69	13:23:54.111907	65.218.172.132	12.232.61.120	H245	Req-MSD
47	117	13:23:54.111962	12.232.61.120	65.218.172.132	H245	Req-TermCapSet
48	69	13:23:54.121921	12.232.61.120	65.218.172.132	H245	Req-MSD
49	65	13:23:54.131936	12.232.61.120	65.218.172.132	H245	Rsp-TCSAck
51	64	13:23:54.151964	12.232.61.120	65.218.172.132	H245	Rsp-MSDAck
52	65	13:23:54.242094	65.218.172.132	12.232.61.120	H245	Rsp-TCSAck
53	64	13:23:54.252108	65.218.172.132	12.232.61.120	H245	Rsp-MSDAck
54	82	13:23:54.292166	65.218.172.132	12.232.61.120	H245	Req-OpenLogCh
55	85	13:23:54.342238	12.232.61.120	65.218.172.132	H245	Rsp-OLCAck
56	82	13:23:54.362267	12.232.61.120	65.218.172.132	H245	Req-OpenLogCh
57	85	13:23:54.522497	65.218.172.132	12.232.61.120	H245	Rsp-OLCAck
59	82	13:23:54.582584	65.218.172.132	12.232.61.120	RTP	Payload=G.723.1
60	82	13:23:54.592598	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
61	82	13:23:54.612627	65.218.172.132	12.232.61.120	RTP	Payload=G.723.1
62	82	13:23:54.622641	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
438	82	13:24:02.023348	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
439	67	13:24:02.043312	12.232.61.120	65.218.172.132	H245	Req-CloseLogCh
440	82	13:24:02.043365	65.218.172.132	12.232.61.120	RTP	Payload=G.723.1
441	64	13:24:02.053326	12.232.61.120	65.218.172.132	H245	Cmd-EndSess
443	82	13:24:02.053428	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
444	108	13:24:02.063340	12.232.61.120	65.218.172.132	Q931	RelCompl
446	82	13:24:02.083369	65.218.172.132	12.232.61.120	RTP	Payload=G.723.1

Faststart (OLC on alerting)



Pkt ID	Pkt Size	Time	Source IP	Destination IP	Protocol	Message
162	405	13:34:01.725612	65.218.172.132	12.232.61.120	Q931	Setup
169	112	13:34:01.855800	12.232.61.120	65.218.172.132	Q931	CallPracd
170	113	13:34:01.865814	12.232.61.120	65.218.172.132	Q931	Alerting
194	298	13:34:03.998881	12.232.61.120	65.218.172.132	RTP	Payload=PCMA
195	249	13:34:04.018910	12.232.61.120	65.218.172.132	Q931	Connect
196	298	13:34:04.028924	12.232.61.120	65.218.172.132	RTP	Payload=PCMA
197	122	13:34:04.029163	12.232.61.120	65.218.172.132	Q931	Facility
198	82	13:34:04.089011	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
199	82	13:34:04.119054	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
200	82	13:34:04.149097	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
218	117	13:34:04.399457	65.218.172.132	12.232.61.120	H245	Req-TermCapSet
219	69	13:34:04.399551	65.218.172.132	12.232.61.120	H245	Req-MSD
220	117	13:34:04.399606	12.232.61.120	65.218.172.132	H245	Req-TermCapSet
221	69	13:34:04.409472	12.232.61.120	65.218.172.132	H245	Req-MSD
222	64	13:34:04.409527	65.218.172.132	12.232.61.120	RTP	Payload=G.723.1
223	64	13:34:04.419486	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
224	65	13:34:04.429500	12.232.61.120	65.218.172.132	H245	Rsp-TCSAck
227	64	13:34:04.439644	12.232.61.120	65.218.172.132	H245	Rsp-MSDAck
228	64	13:34:04.479572	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
229	65	13:34:04.529644	65.218.172.132	12.232.61.120	H245	Rsp-TCSAck
230	64	13:34:04.539659	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
231	64	13:34:04.539710	65.218.172.132	12.232.61.120	H245	Rsp-MSDAck
232	64	13:34:04.629788	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
236	64	13:34:04.749961	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
239	64	13:34:04.800033	12.232.61.120	65.218.172.132	H245	Rsp-MSDAck
241	82	13:34:04.840091	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
246	82	13:34:04.950249	65.218.172.132	12.232.61.120	RTP	Payload=G.723.1
247	82	13:34:04.950315	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
697	67	13:34:10.708529	12.232.61.120	65.218.172.132	H245	Req-CloseLogCh
698	82	13:34:10.718544	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
699	67	13:34:10.718609	12.232.61.120	65.218.172.132	H245	Req-CloseLogCh
700	64	13:34:10.728558	12.232.61.120	65.218.172.132	H245	Cmd-EndSess
702	82	13:34:10.748587	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
703	108	13:34:10.748652	12.232.61.120	65.218.172.132	Q931	RelCompl
705	64	13:34:10.758652	65.218.172.132	12.232.61.120	RTP	Payload=G.723.1
706	82	13:34:10.778630	12.232.61.120	65.218.172.132	RTP	Payload=G.723.1
707	64	13:34:10.788644	65.218.172.132	12.232.61.120	RTP	Payload=G.723.1
710	66	13:34:10.828702	65.218.172.132	12.232.61.120	H245	Rsp-CLCAck
712	66	13:34:10.848731	65.218.172.132	12.232.61.120	H245	Rsp-CLCAck
727	82	13:34:10.968904	65.218.172.132	12.232.61.120	RTP	Payload=G.723.1

Faststart has allowed the media RTP packets to start before connect. H.245 exchanges and open logical Channel still continue as an H.245 channel is required to pass for instance out-of-band DTMF and initiate T.38 exchanges if required.

Supported Features

Faststart

Early h.245

T.38 (TCP)

T.38 (UDP) – available from Release 4



In Registration RRQ messages and Q.931 Setup, Alerting and Connect messages the Vega will report:

- t35CountryCode 0xB4 (UK)
- manufacturerCode 0x5600 (assigned to VegaStream)
- ProductId eg **VS5:R** (hardware identification)
- VersionId eg 04.01.05aT001 (software version)

Unsupported features

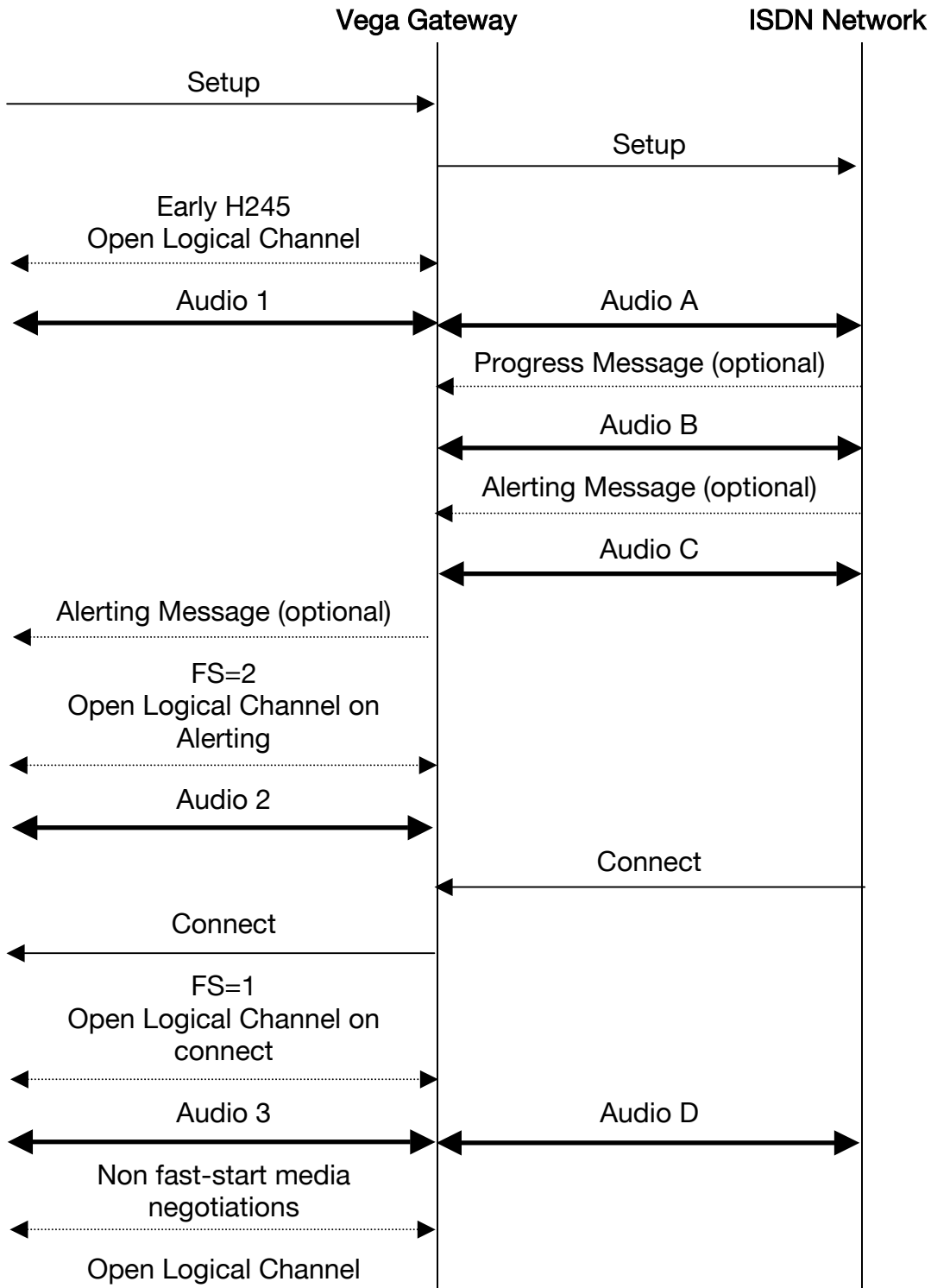
H.323 signalling messages over UDP

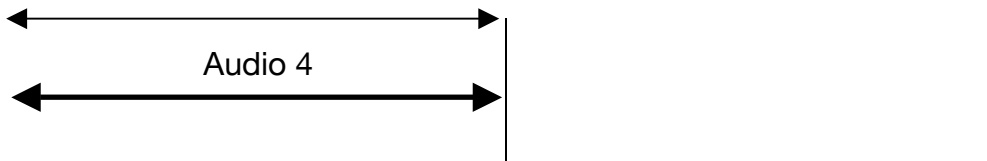
Other Notes

H.323 Vegas support h245 tunnelling (h323.use_h245_tunnel and h323.accept_h245_tunnel) – if enabled this causes the Vega to tunnel the H.245 messages through the sockets set up for the H.225 messages (e.g. Q.931) – so as to reduce the number of sockets that have to be used – which can be a severe limit on many servers.

Audio Connection times

Call H.323 to ISDN





Audio can connect at various stages depending upon settings / Vega implementation. To get a clear audio path both an Audio <number> and an Audio <letter> must be made.

Audio 1 – audio gets connected at this point if early h245 is enabled (fast start disabled).

Audio 2 – audio gets connected at this point if fast start = 2 (connect on Alerting) and an alerting message is received

Audio 3 - audio gets connected at this point if fast start =1 (connect on connect)

Audio 4 - audio gets connected at this point if fast start and early h245 are disabled

Audio A - audio should connect here if the ISDN setup message indicates in-band audio

Audio B - audio should connect here if the ISDN progress message indicates in-band audio

Audio C - audio should connect here if the ISDN alerting message indicates in-band audio

Audio D - audio connects here on the connect message if it is not connected before.

FXS receives “Connect” as the handset is lifted – there is no possibility of earlier in-band media indication.

FXO receives “Connect” on seizing the outgoing line, so the caller will hear the PBX / CO switch dial tone, the Vega outdialing the DTMF tones and any following call progress tones.

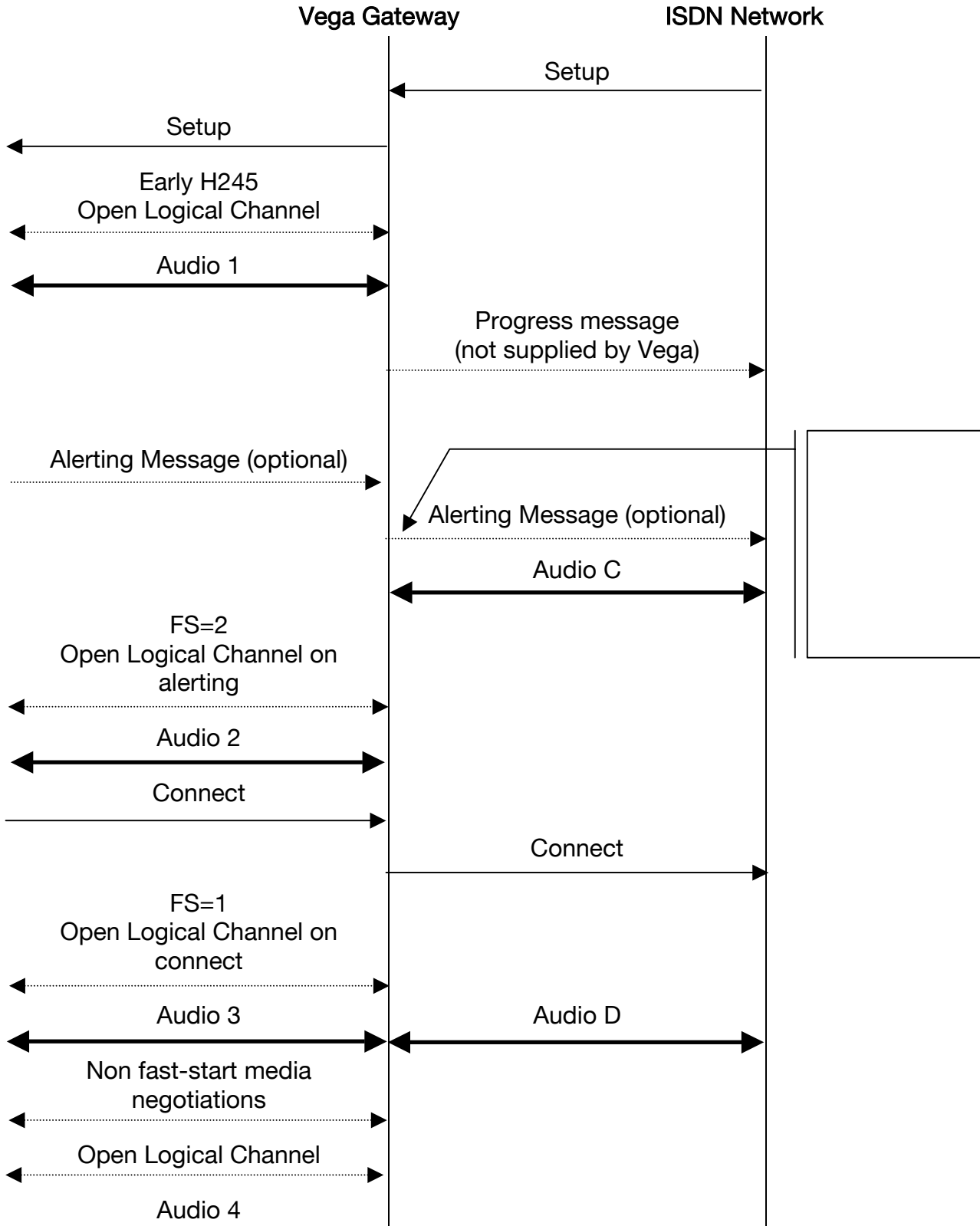
Notes:

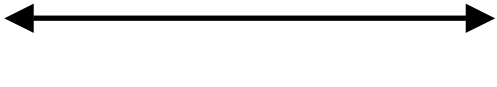
1. The diagrams assume that both ends handle the Open Logical Channel and provision of audio in a timely manner. Each end has to provide the other end with information about where to send the audio, and the other end then has to send the audio.
2. Early h245
Incoming H323 calls: accept_early_h245=1
 If the other end sends an H245 address to the Vega, it will initiate H.245 exchanges immediately; the OLC will happen at the end of the exchanges and the Vega will start to send audio to the far end.
Outgoing H323 calls: use_early_h245=1
 The Vega will send an H245 address in the Setup – for audio to be connected requires the far end to respond.
3. Faststart = 2 - OLC is after alerting
Incoming fast start call: accept_fast_start=2
 The Vega will send the OLC and OLC_Acknowledge IN the Alerting message
Outgoing fast start call: use_fast_start=1
 The Vega will send the OLC offers IN the Setup message
4. Faststart = 1 - OLC is after connect
Incoming fast start call: accept_fast_start=1
 The Vega will send the OLC and OLC_Acknowledge IN the Connect message
Outgoing fast start call: use_fast_start=1
 The Vega will send the OLC offers IN the Setup message

5. Non faststart, non early H.245

The media negotiation follows the Connect, once agreed the OLCs occur (2 OLCs – one for each direction)

Call ISDN to H.323





Audio can connect at various stages depending upon settings / Vega implementation. To get a clear audio path both an Audio <number> and an Audio <letter> must be made.

Audio 1 – audio gets connected at this point if early h245 is enabled (fast start disabled).

Audio 2 – audio gets connected at this point if fast start = 2 (connect on Alerting) and an alerting message is received

Audio 3 - audio gets connected at this point if fast start =1 (connect on connect)

Audio 4 - audio gets connected at this point if fast start and early h245 are disabled

Audio C - audio connects here if the Vega generates ringback tone (alerting message indicates in-band audio)

Audio D - audio connects here on the connect message if it is not connected before.

FXS has no connect state, so the audio is connected on the telecoms side as soon as the line is seized.

FXO Vega will trigger a SETUP when it detects inbound ringing. It answers the call (seizes the line) when the H.323 Connect is received, so the audio path connection occurs on call answer.

Notes:

1. See notes on page 11.
2. For calls ISDN to H.323, if the Vega trunk is configured as TE, the variable `_advanced.user_progress` controls whether progress tones are generated by the Vega. (The Vega needs to generate the tones if the Network does not.)

RTCP

Real Time Control Protocol is the control protocol that runs alongside RTP that allows monitoring of the data delivery. RTP uses even numbered IP ports and the associated RTCP stream uses the next higher (odd) numbered port. Both streams of data are between the same two IP end points.

In Vegas, an RTCP packet will be sent every 5 seconds. Details of RTCP content defined in RFC 1889 - RTP: A Transport Protocol for Real-Time Applications.

Contact Details

Email: support@vegastream.com

Web: <http://www.vegastream.com>

EMEA Office
VegaStream Limited
Berkshire Court
Western Road
Bracknell
Berks RG12 1RE
UK

+44 (0) 1344 784900

USA Office
VegaStream Inc.
3701 FAU Boulevard
Suite 200
Boca Raton
FL 33431
USA

+1 561 995 2300