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IANA Considerations for IAX: Inter-Asterisk eXchange Version 2

Abstract

This document establishes the IANA registries for IAX, the Inter-Asterisk eXchange protocol, an application-layer control and media protocol for creating, modifying, and terminating multimedia sessions over Internet Protocol (IP) networks. IAX was developed by the open source community for the Asterisk PBX and is targeted primarily at Voice over Internet Protocol (VoIP) call control, but it can be used with streaming video or any other type of multimedia.

Status of This Memo

This document is not an Internet Standards Track specification; it is published for informational purposes.

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IESG Note

The IESG thinks that this work is related to IETF work done in SIP, MMUSIC, and AVT WGs, but this does not prevent publishing.

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1. Introduction

IAX (Inter-Asterisk eXchange) is an "all-in-one" protocol for handling multimedia in IP networks. It combines both control and media services in the same protocol. In addition, IAX uses a single UDP data stream on a static port greatly simplifying Network Address Translation (NAT) gateway traversal, eliminating the need for other protocols to work around NAT, and simplifying network and firewall management. IAX employs a compact encoding that decreases bandwidth usage and is well suited for Internet telephony service. In addition, its open nature permits new payload type additions needed to support additional services.

This document specifies and provides the initial values for the creation of the IAX-related IANA registries as per [RFC5226].

2. IANA Considerations

The IAX protocol, as defined in [RFC5456], defines 15 namespaces that have been registered. These namespaces are described below.

Each of these namespaces utilizes an 'Expert Review' for extension. Documentation of new values is not mandated as RFCs. The Expert Review should be guided by a few common sense considerations. For example, new values should not be specific to a country, region, organization, or company; they should be well-defined and widely recognized.

2.1. Meta Command

Registry Name: IAX Meta Commands

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.1.3.2 of [RFC5456].

Valid Range: 0x01-x7F.

Display format: hex.

The following table specifies the initial assignments of Meta Command values:

TYPE	Name	Description
0x01	Trunk Meta Frame	Indicates that frame is a trunk meta frame.

2.2. Frame Types

Registry Name: IAX Frame Types

Required Information for New Values: Name, description, and relevant security considerations, if any. In addition, the definition and description of subclasses.

Description: See Section 8.2 of [RFC5456].

Valid Range: 0x01-xFF.

Display format: hex.

The following table specifies the initial assignments of Frame Type Values:

TYPE	Description	Subclass Description	Data Description
0x01	DTMF	0-9, A-D, *, #	Undefined
0x02	Voice	Audio Compression Format	Data
0x03	Video	Video Compression Format	Data
0x04	Control	See Control Frame Subclass	Varies with subclass
0x05	Null	Undefined	Undefined
0x06	IAX Control	See IAX Protocol Messages	Information Elements
0x07	Text	Always 0	Raw Text
0x08	Image	Image Compression Format	Raw image
0x09	HTML	See HTML Frame Types	Message Specific
0x0A	Comfort Noise	Level in -dBov of comfort noise	None

2.3. Control Frame Subclass

Registry Name: IAX Control Frame Subclass

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.3 of [RFC5456].

Valid Range: 0x00-x7F.

Display format: hex.

The following table specifies the initial assignments of Control Frame Subclasses:

VALUE	Name	Description
0x01	Hangup	The call has been hungup at the remote end
0x02	Reserved	Reserved for future use
0x03	Ringing	Remote end is ringing (ring-back)
0x04	Answer	Remote end has answered
0x05	Busy	Remote end is busy
0x06	Reserved	Reserved for future use
0x07	Reserved	Reserved for future use
0x08	Congestion	The call is congested
0x09	Flash Hook	Flash hook
0x0a	Reserved	Reserved for future use
0x0b	Option	Device-specific options are being transmitted
0x0c	Key Radio	Key Radio
0x0d	Unkey Radio	Unkey Radio
0x0e	Call Progress	Call is in progress
0x0f	Call Proceeding	Call is proceeding
0x10	Hold	Call is placed on hold
0x11	Unhold	Call is taken off hold

2.4. IAX Control Frames

Registry Name: IAX Control Frames

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.4 of [RFC5456].

Valid Range: 0x01-x7F.

Display format: hex.

The following table specifies the initial assignments of IAX Control Frame values:

Hex	Name	Description
0x01	NEW	Initiate a new call
0x02	PING	Ping request
0x03	PONG	Ping or poke reply
0x04	ACK	Explicit acknowledgment
0x05	HANGUP	Initiate call tear-down
0x06	REJECT	Reject a call
0x07	ACCEPT	Accept a call
0x08	AUTHREQ	Authentication request
0x09	AUTHREP	Authentication reply
0x0a	INVAL	Invalid message
0x0b	LAGRQ	Lag request
0x0c	LAGRP	Lag reply
0x0d	REGREQ	Registration request
0x0e	REGAUTH	Registration authentication
0x0f	REGACK	Registration acknowledgement

0x10	REGREJ	Registration reject
0x11	REGREL	Registration release
0x12	VNAK	Video/Voice retransmit request
0x13	DPREQ	Dialplan request
0x14	DPREP	Dialplan reply
0x15	DIAL	Dial
0x16	TXREQ	Transfer request
0x17	TXCNT	Transfer connect
0x18	TXACC	Transfer accept
0x19	TXREADY	Transfer ready
0x1a	TXREL	Transfer release
0x1b	TXREJ	Transfer reject
0x1c	QUELCH	Halt audio/video [media] transmission
0x1d	UNQUELCH	Resume audio/video [media] transmission
0x1e	POKE	Poke request
0x1f	Reserved	Reserved for future use
0x20	MWI	Message waiting indication
0x21	UNSUPPORT	Unsupported message
0x22	TRANSFER	Remote transfer request
0x23	Reserved	Reserved for future use
0x24	Reserved	Reserved for future use
0x25	Reserved	Reserved for future use

2.5. HTML Command Subclasses

Registry Name: IAX HTML Command Subclasses

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.2 of [RFC5456].

Valid Range: 0x01-x7F.

Display format: hex.

The following table specifies the initial assignments of IAX HTML Command Subclasses:

NUMBER	DESCRIPTION
0x01	Sending a URL
0x02	Data frame
0x04	Beginning frame
0x08	End frame
0x10	Load is complete
0x11	Peer does not support HTML
0x12	Link URL
0x13	Unlink URL
0x14	Reject Link URL

2.6. Information Elements

Registry Name: IAX Information Elements

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.6 of [RFC5456].

Valid Range: 0x01-xFF.

Display format: hex.

The following table specifies the Initial Assignments of Information Element Definitions:

HEX	NAME	DESCRIPTION
0x01	CALLED NUMBER	Number/extension being called
0x02	CALLING NUMBER	Calling number
0x03	CALLING ANI	Calling number ANI for billing
0x04	CALLING NAME	Name of caller
0x05	CALLED CONTEXT	Context for number
0x06	USERNAME	Username (peer or user) for authentication
0x07	PASSWORD	Password for authentication
0x08	CAPABILITY	Actual CODEC capability
0x09	FORMAT	Desired CODEC format
0x0a	LANGUAGE	Desired language
0x0b	VERSION	Protocol version
0x0c	ADSICPE	CPE ADSI capability
0x0d	DNID	Originally dialed DNID
0x0e	AUTHMETHODS	Authentication method(s)
0x0f	CHALLENGE	Challenge data for MD5/RSA
0x10	MD5 RESULT	MD5 challenge result
0x11	RSA RESULT	RSA challenge result
0x12	APPARENT ADDR	Apparent address of peer
0x13	REFRESH	When to refresh registration
0x14	DPSTATUS	Dialplan status

0x15	CALLNO	Call number of peer
0x16	CAUSE	Cause
0x17	IAX UNKNOWN	Unknown IAX command
0x18	MSGCOUNT	How many messages waiting
0x19	AUTOANSWER	Request auto-answering
0x1a	MUSICONHOLD	Request musiconhold with QUELCH
0x1b	TRANSFERID	Transfer Request Identifier
0x1c	RDNIS	Referring DNIS
0x1d	Reserved	Reserved for future use
0x1e	Reserved	Reserved for future use
0x1f	DATETIME	Date/Time
0x20	Reserved	Reserved for future use
0x21	Reserved	Reserved for future use
0x22	Reserved	Reserved for future use
0x23	Reserved	Reserved for future use
0x24	Reserved	Reserved for future use
0x25	Reserved	Reserved for future use
0x26	CALLINGPRES	Calling presentation
0x27	CALLINGTON	Calling type of number
0x28	CALLINGTNS	Calling transit network select
0x29	SAMPLINGRATE	Supported sampling rates
0x2a	CAUSECODE	Hangup cause
0x2b	ENCRYPTION	Encryption format
0x2c	ENCKEY	Reserved for future use

0x2d	CODEC PREFS	CODEC Negotiation
0x2e	RR JITTER	Received jitter, as in RFC 3550
0x2f	RR LOSS	Received loss, as in RFC 3550
0x30	RR PKTS	Received frames
0x31	RR DELAY	Max playout delay for received frames in ms
0x32	RR DROPPED	Dropped frames (presumably by jitter buffer)
0x33	RR OOO	Frames received Out of Order
0x34	OSPTOKEN	OSP Token Block

Table 1: Information Element Definitions

2.7. Authentication Methods

Registry Name: IAX Authentication Methods

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.6.13 of [RFC5456].

Valid Range: 0x0001-xFFFF bitmask, values must be a power of two.

Display format: hex.

The following table specifies the initial assignments of IAX Authentication Methods:

METHOD	DESCRIPTION
0x0001	Reserved (was Plaintext)
0x0002	MD5
0x0004	RSA

2.8. Dialplan Status Flags

Registry Name: IAX Dialplan Status Flags

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.6.19 of [RFC5456].

Valid Range: 0x0001-xFFFF bitmask, values must be a power of two.

Display format: hex.

The following table specifies the initial assignments of IAX dialplan status flags:

FLAG	DESCRIPTION
0x0001	Exists
0x0002	Can exist
0x0004	Non-existent
0x4000	Retain dialtone (ignorepat)
0x8000	More digits may match number

2.9. Calling Presentation

Registry Name: IAX Calling Presentation

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.6.29 of [RFC5456].

Valid Range: 0x00-xFF.

Display format: hex.

The following table specifies the initial assignments of calling presentation values:

FLAG	PRESENTATION
0x00	Allowed user/number not screened
0x01	Allowed user/number passed screen
0x02	Allowed user/number failed screen
0x03	Allowed network number
0x20	Prohibited user/number not screened
0x21	Prohibited user/number passed screen
0x22	Prohibited user/number failed screen
0x23	Prohibited network number
0x43	Number not available

NOTE: The values in this table are derived from Q.931; however, future values may be from other sources.

2.10. Calling Type of Number (CALLINGTON)

Registry Name: IAX Calling Type of Number

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.6.30 of [RFC5456].

Valid Range: 0x00-xFF.

Display format: hex.

The following table specifies the initial assignments of valid calling type of number values:

VALUE	DESCRIPTION
0x00	Unknown
0x10	International Number
0x20	National Number
0x30	Network Specific Number
0x40	Subscriber Number
0x60	Abbreviated Number
0x70	Reserved for extension

NOTE: The values in this table are derived from Q.931; however, future values may be from other sources.

2.11. IAX Transit Network Identification

Registry Name: IAX Transit Network Identification Plan

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.6.31 of [RFC5456].

Valid Range: 0000-1111 (four bits).

Display format: binary.

The following table specifies the initial assignments of IAX Calling Type of Number values:

BITS	DESCRIPTION
0000	Unknown
0001	Caller Identification Code
0011	Data Network Identification Code

NOTE: The values in this table are derived from Q.931; however, future values may be from other sources.

2.12. IAX Type of Network

Registry Name: IAX Type of Network

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.6.30 of [RFC5456].

Valid Range: 000-111 (three bits).

Display format: binary.

The following table specifies the initial assignments of IAX Calling Type of Network values:

BITS	DESCRIPTION
000	User Specified
010	National Network Identification
011	International Network Identification

NOTE: The values in this table are derived from Q.931, however, future values may be from other sources.

2.13. Cause Codes

Registry Name: IAX Cause Codes

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.6.30 of [RFC5456].

Valid Range: 1-255.

Display format: decimal.

The following table specifies the initial assignments of IAX Cause Code values:

NUMBER	CAUSE
1	Unassigned/unallocated number
2	No route to specified transit network
3	No route to destination
6	Channel unacceptable
7	Call awarded and delivered
16	Normal call clearing
17	User busy
18	No user response
19	No answer
21	Call rejected
22	Number changed
27	Destination out of order
28	Invalid number format/incomplete number
29	Facility rejected
30	Response to status enquiry

31	Normal, unspecified
34	No circuit/channel available
38	Network out of order
41	Temporary failure
42	Switch congestion
43	Access information discarded
44	Requested channel not available
45	Preempted (causes.h only)
47	Resource unavailable, unspecified (Q.931 only)
50	Facility not subscribed (causes.h only)
52	Outgoing call barred (causes.h only)
54	Incoming call barred (causes.h only)
57	Bearer capability not authorized
58	Bearer capability not available
63	Service or option not available (Q.931 only)
65	Bearer capability not implemented
66	Channel type not implemented
69	Facility not implemented
70	Only restricted digital information bearer capability is available (Q.931 only)
79	Service or option not available (Q.931 only)
81	Invalid call reference
82	Identified channel does not exist (Q.931 only)
83	A suspended call exists, but this call identity does not (Q.931 only)

84	Call identity in use (Q.931 only)
85	No call suspended (Q.931 only)
86	Call has been cleared (Q.931 only)
88	Incompatible destination
91	Invalid transit network selection (Q.931 only)
95	Invalid message, unspecified
96	Mandatory information element missing (Q.931 only)
97	Message type nonexistent/not implemented
98	Message not compatible with call state
99	Information element nonexistent
100	Invalid information element contents
101	Message not compatible with call state
102	Recovery on timer expiration
103	Mandatory information element length error (causes.h only)
111	Protocol error, unspecified
127	Internetworking, unspecified

2.14. Encryption Methods

Registry Name: IAX Encryption Methods

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.6.34 of [RFC5456].

Valid Range: 0x0001-x8000 bitmask, values must be a power of two.

Display format: hex.

The following table specifies the initial assignments of IAX encryption methods:

METHOD	DESCRIPTION
0x0001	AES-128

2.15. Media Formats

Registry Name: IAX Media Formats

Required Information for New Values: Name, description, and relevant security considerations, if any.

Description: See Section 8.7 of [RFC5456].

Valid Range: 0x0001-x8000 bitmask, values must be a power of two.

Display format: hex.

The following table specifies the initial assignments of IAX Media Format Values

SUBCLASS	DESCRIPTION
0x00000001	G.723.1
0x00000002	GSM Full Rate
0x00000004	G.711 mu-law
0x00000008	G.711 a-law
0x00000010	G.726
0x00000020	IMA ADPCM
0x00000040	16-bit linear little-endian
0x00000080	LPC10
0x00000100	G.729
0x00000200	Speex

0x00000400	ILBC
0x00000800	G.726 AAL2
0x00001000	G.722
0x00002000	AMR
0x00010000	JPEG
0x00020000	PNG
0x00040000	H.261
0x00080000	H.263
0x00100000	H.263p
0x00200000	H.264

3. Security Considerations

This document defines IAX registries and as such does not raise security issues beyond those discussed in [RFC5456].

4. Acknowledgments

The author would like to thank Marc Blanchet and Michelle Cotton for their support and suggestions.

5. Normative References

[RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 5226, May 2008.

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