IP Office™ Platform

Description of Location API Introduced in Release 10.0

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Contents

1 Introduction

1.1 Purpose

This document forms part of the SDK for the location API. An example application is included in the SDK to demonstrate/exercise the interface - it has no functionality for determine the appropriate location to set. This document provides detailed information about the Location API introduced in IP Office Release 10.0. It does not cover mechanisms or recommendations for determining the location to set.

1.2 Intended Audience

This document is for Dev Connect partners developing applications for dynamically determining and setting the location of extensions. They will need details of the Emergency Location API format. The mechanisms for ascertaining the location are beyond the scope of this document.

The API also includes notification of an emergency call for an application combining Location setting and On-Site Notification.

Background information not specifically relating to the format of the alarm is for information only, consult other documentation for reference, primarily IP Office Manager Manual/Help.

1.3 Document Changes

1)	7-June-2016	First Release
2)	1-August-2025	Updated for release 12.2

1.4 Background

Locations for extensions are configurable in the IP Office configuration. However that relies on knowing that being a fixed location - for example the extension is a standard deskphone. Or the IP Office assigning the location by IP Address range at registration.

For devices like cordless phones, the precise location can not normally be set accurately. So if the location is sent manually, only a broad 'coverall' location can be used.

However, if the cordless system offers the capability to track which Base Station a device is using, then this API can dynamically set the extension location as the device moves round the system.

It is up to the developer to determine the suitability of mechanisms for identifying the location. Some obvious concerns are strange radio propagations patterns or people re-patching ports if the attempt is by port mapping on a switch.

1.5 API

1.6 Availability

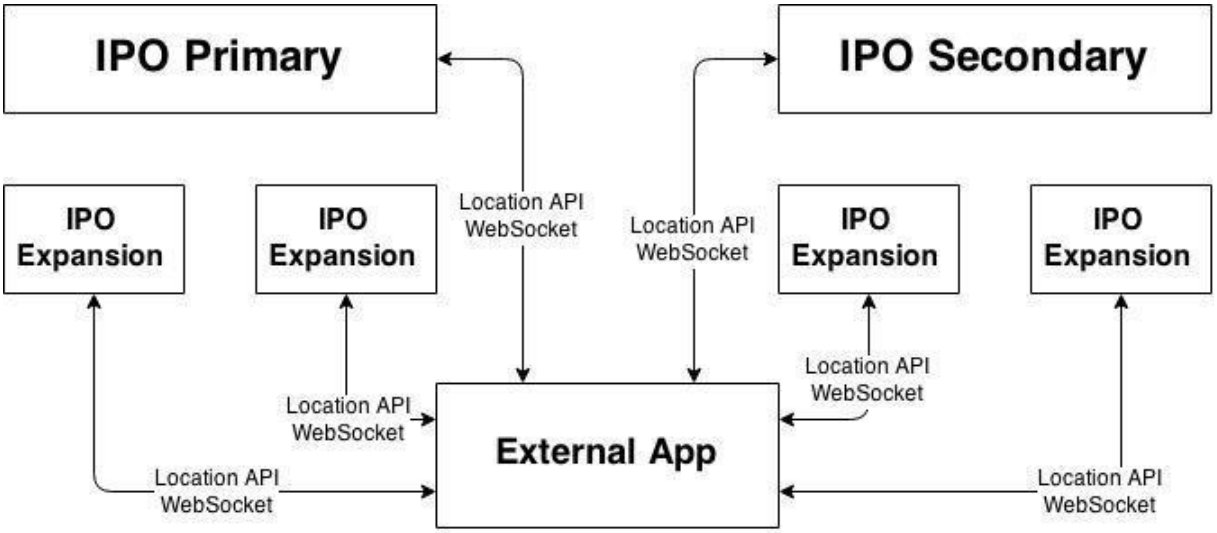
IP Office Release R12.2, for IP500v2, SCN, Server Edition, and Select.

1.7 Licensing

There is no license for this API.

1.8 Connectivity

In an SCN or a Server Edition (including Select) network there must be a direct connection from the external application to each system/server in the network. This is necessary to avoid the creation of a single point of failure if one system acted as a concentrator for any other systems.



Only a single connection is supported to each system/server.

1.9 Connection

The connection to the IP Office is Web Socket - RFC 6455. Only a secure connection is supported. Certificate checks are optional. There is no re-Keying during an active session.

Connection is on port 443 to https://[IPADDRESS]/locationapi/ and is done via the usual TLS negotiation and Websocket requests as per the RFCs. First the TLS public key exchange takes place and then, after a secure connection is setup, the app sends a GET request to the URL above:

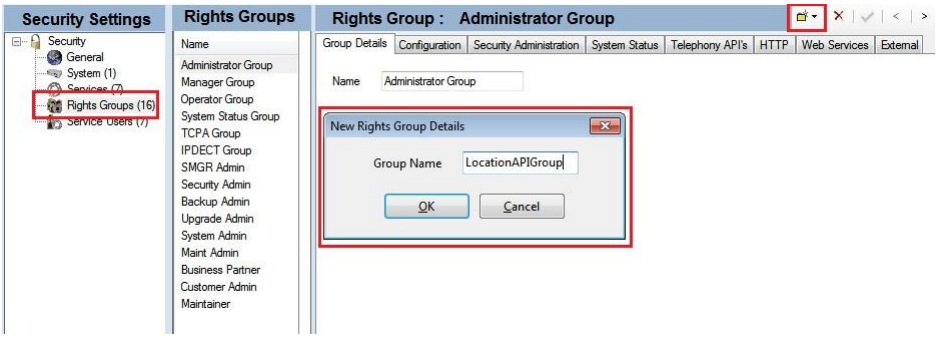
```
GET /locationapi/ HTTP/1.1
Connection: Upgrade
Authorization: Basic QWRtaW5pc3RyYXRvcjpBZG1pbmlzdHJhdG9yMQ==
User-Agent: Avaya-IPO-Dynamic-Location
Host: 192.168.42.3:443
Upgrade: websocket
Sec-WebSocket-Key: XC5nSC1caixzaUpDPFc7OQ==
Sec-WebSocket-Version: 1
Sec-WebSocket-Protocol: locationapi
Sec-WebSocket-Origin: -
Sec-WebSocket-Extensions: -
Cookie: -
```

If the IP Office responds with "`HTTP/1.1 101 Switching Protocols`" then the connection is complete. If otherwise then the received HTTP error codes are treated as per the HTTP standard.

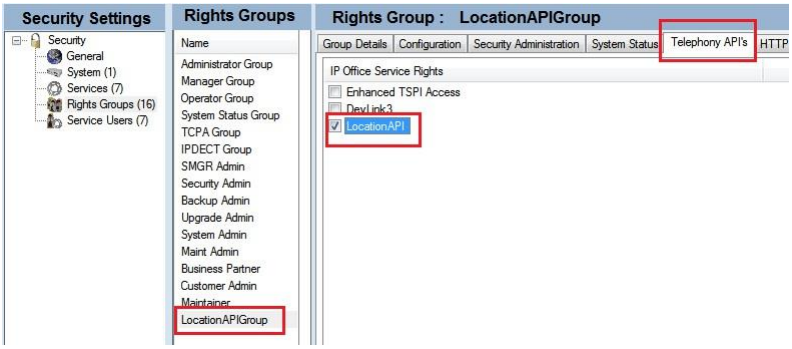
There must be a Service User with a suitable password and having permission for the Location API.

Best security practice dictates that User credentials should not be shared, and any credentials should have the minimum access required for fulfil the required task, so;

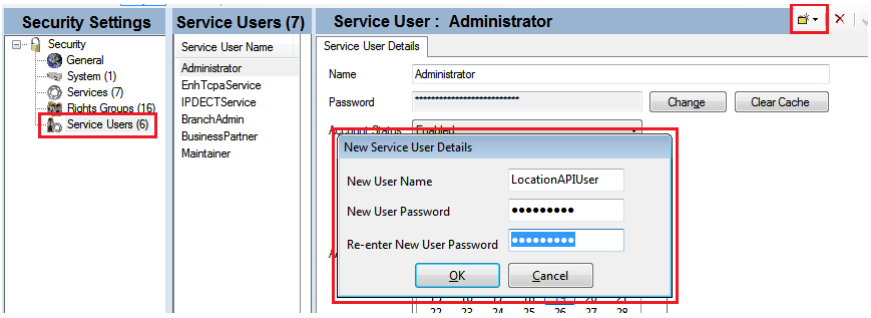
Create a Rights Group for the Location API application.



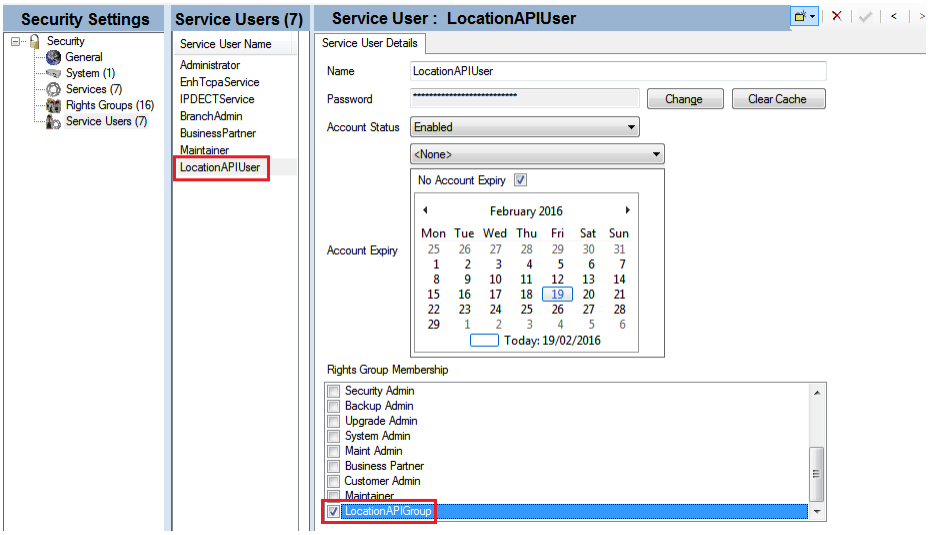
Only give access to the API.



Create a User for the API application.



Assign the User to just the Location API group membership.



See the IP Office Manager documentation for detail descriptions of IP Office security administration - link in the References section.

1.10 Operation

The system maintainer can manually configure Locations for extensions using IP Office Manager. If set, these are used to determine various things including the call handling for emergency calls by those extension.

The API permits extensions to have a dynamic location value that overrides their manual location for emergency calls. The dynamic location is not permanently stored in the IP Office config and, as the name implies, it is not preserved through restarts.

If set, the dynamic location is used in preference to the manual location. The dynamic location remains set until it is reset via the API or from IP Office System Status Application or the system is re-booted.

For details of IP Office Emergency Call handling see References.

2 Messages - API to IP Office

Only a single message can be outstanding. The external application must wait for a response to a message before sending the next.

Messages from the application to the IP Office are in the form of simple text strings. They are not terminated (no CR/LF, LF/CR or null), and must be in a single WebSocket message.

Message	Meaning	Response
`Hello`	Initiates a connection to IP Office	3.1.1
`Get PBXs`	Requests the list of PBXs present in the same Solution as the current PBX	3.2.1
`Get Extensions`	Requests the list of Extensions currently registered with IP Office.	3.2.2
`Get Locations`	Requests the list of Locations currently defined on IP Office. Can be used to ensure that the Application is connected to each system	3.2.3
`Extn Registration Subscribe`	Subscribes to information about Extensions newly registered to the connected IP Office	3.2.4
`Extn Registration Unsubscribe`	Unsubscribes from information about Extensions newly registered to the connected IP Office	3.2.5
`Set Dynamic Location <GUID> <Location ID>`	Sets the Dynamic Location value for the Extension with the GUID set as parameter. A Single Space character (0x20) is required between the message "Set Dynamic Location", GUID and Location ID.	3.2.6
`Test Location API`	Application level PING	3.1.2
`Location API Operational`	Application response to a PING request from the IP Office	3.1.3
`Close Link`	Closes the connection to the IP Office	3.1.4
`NG 911`	Reserved for future use	3.2.7
`NG911 Subscribe`	Reserved for future use	3.2.7
`Bad Dummy Command`	Guaranteed to generate the Bad Command error for testing purposes.	3.1.6

3 Message Format IP Office to API

All 'responses' from the IP Office are XML formatted. Messages may come without any querying message - for example an extension registration, or emergency call notification.

3.1 Link Management Messages

Message	Meaning
`Hello`	Link start-up
`Test Location API`	Application level PING
`Close Link`	Closes the connection to the IP Office
`Controlled shutdown`	The IP Office is being shutdown from an admin interface, for upgrade for example.
`Bad Command`	

3.1.1 Hello

The response contains both the list of extensions and locations (the same output as Get Extensions and Get Locations put together in the same message) for the Node the API has connected to. Having connected the API is automatically subscribed to extension registration updates - see section 3.2.4.

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <NodeInformation>
                <NodeName>TestSystem</NodeName>
                <NodeAddress>C0A82A03</NodeAddress>
                <VersionType>10.0.0.9001.0</VersionType>
                <Extension>
                    <GUID>DF3C0600947611DE80E7080027DDD1F2</GUID>
                    <Extension>1001</Extension>
                    <TypeInfo>H323</TypeInfo>
                    <HWInfo>
                        <IPAddress>C0A82A67</IPAddress>
                        <Mac>CCF954AAECFB</Mac>
                    </HWInfo>
                    <StdEmLoc>3</StdEmLoc>
                    <DynEmLoc>0</DynEmLoc>
                </Extension>
                <Location>
                    <ID>2</ID>
                    <Name>loc2</Name>
                    <Address>
                        <country>US</country>
                        <A1>01</A1>
                        <A2>02</A2>
                        <A3>03</A3>
                        <A4>04</A4>
```

```
                        <A5>05</A5>
                        <A6>06</A6>
                        <PRD>11</PRD>
                        <POD>12</POD>
                        <STS>13</STS>
                        <HNO>16</HNO>
                        <HNS>17</HNS>
                        <LMK>18</LMK>
                        <LOC>20</LOC>
                        <NAM>26</NAM>
                        <PC>29</PC>
                        <BLD>19</BLD>
                        <UNIT>23</UNIT>
                        <FLR>22</FLR>
                        <ROOM>24</ROOM>
                        <PLC>21</PLC>
                        <PCN>28</PCN>
                        <POBOX>30</POBOX>
                        <ADDCODE>27</ADDCODE>
                        <SEAT>25</SEAT>
                        <RD>07</RD>
                        <RDSEC>08</RDSEC>
                        <RDBR>09</RDBR>
                        <RDSUBBR>10</RDSUBBR>
                        <PRM>14</PRM>
                        <POM>15</POM>
                    </Address>
                </Location>
                <Location>
                    <SystemLocation>Yes</SystemLocation>
                    <ID>3</ID>
                    <Name>loc1</Name>
                    <Address>
                        <country>US</country>
                    </Address>
                </Location>
            </NodeInformation>
        </ws_object>
    </data>
</response>
```

3.1.2 Test Location API Response

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
```

```
            <TestLocationAPI>Location API
Operational</TestLocationAPI>
        </ws_object>
    </data>
</response>
```

3.1.3 Test Location API

IP Office may send this to test that the application is still awake. This can also be triggered form the IP Office System Status Application (SSA).

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>Test Location API</ws_object>
    </data>
</response>
```

The application should reply with **"**`Location API Operational`**"** formatted as simple text like commands.

3.1.4 Close Location API

Either in response to the command or by another interface (SSA for example).

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>Close Link</ws_object>
    </data>
</response>
```

3.1.5 When the IP Office is Shutdown

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <Shutdown>Controlled shutdown</Shutdown>
        </ws_object>
    </data>
</response>
```

3.1.6 Bad Command

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
```

```
            <InvalidCommand>Invalid command received: Bad Dummy
Command</InvalidCommand>
        </ws_object>
    </data>
</response>
```

3.2 Responses to requests

Message	Meaning
PBX List	Response to Get PBXs
Extension List	Response to Get Extensions
Location List	Response to Get Locations
Extension Registration Subscription Confirmation	Response to Extn Registration Subscribe
Extension Registration UnSubscribe Confirmation	Response to Extn Registration Unsubscribe
Set Dynamic Location	Response to setting the dynamic location for an extension
Not Implemented	Response to the NG911 placeholder commands

3.2.1 PBX List

3.2.1.1 Success

Lists the other IP Offices in the SCN/SE solution, the one the API is connected to is not repeated.

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <NodeInformation>
                <NodeName>ipol_secondary</NodeName>
                <NodeState>Up</NodeState>
                <NodeAddress>C0A82A04</NodeAddress>
                <VersionType>10.0.0.311.0</VersionType>
            </NodeInformation>
            <NodeInformation>
                <NodeName>se_expansion</NodeName>
                <NodeState>Up</NodeState>
                <NodeAddress>C0A82A20</NodeAddress>
                <VersionType>10.0.0.9046.0</VersionType>
            </NodeInformation>
        </ws_object>
    </data>
</response>
```

3.2.1.2 Failure

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
```

```
            <NodeInformation>
           There are no PBXs in the SCN
            </NodeInformation>
        </ws_object>
    </data>
</response>
```

3.2.2 Extension List

3.2.2.1 Success

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <Extension>
                <GUID>DF3C0600947611DE80E7080027DDD1F2</GUID>
                <Extension>1001</Extension>
                <TypeInfo>H323</TypeInfo>
                <HWInfo>
                    <IPAddress>C0A82A67</IPAddress>
                    <Mac>CCF954AAECFB</Mac>
                </HWInfo>
                <StdEmLoc>3</StdEmLoc>
                <DynEmLoc>0</DynEmLoc>
            </Extension>
        </ws_object>
    </data>
</response>
```

3.2.2.2 Failure

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <Extension>
           There are no Extensions present on this PBX
            </Extension>
        </ws_object>
    </data>
</response>
```

3.2.3 Location List

3.2.3.1 Success

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <Location>
```

```
                <ID>2</ID>
                <Name>loc2</Name>
                <Address>
                    <country>US</country>
                    <A1>Dummy 01</A1>
                    <A2>Dummy 02</A2>
                    <A3>Dummy 03</A3>
                    <A4>Dummy 04</A4>
                    <A5>Dummy 05</A5>
                    <A6>Dummy 06</A6>
                    <PRD>Dummy 11</PRD>
                    <POD>Dummy 12</POD>
                    <STS>Dummy 13</STS>
                    <HNO>Dummy 16</HNO>
                    <HNS>Dummy 17</HNS>
                    <LMK>Dummy 18</LMK>
                    <LOC>Dummy 20</LOC>
                    <NAM>Dummy 26</NAM>
                    <PC>Dummy 29</PC>
                    <BLD>Dummy 19</BLD>
                    <UNIT>Dummy 23</UNIT>
                    <FLR>Dummy 22</FLR>
                    <ROOM>Dummy 24</ROOM>
                    <PLC>Dummy 21</PLC>
                    <PCN>Dummy 28</PCN>
                    <POBOX>Dummy 30</POBOX>
                    <ADDCODE>Dummy 27</ADDCODE>
                    <SEAT>Dummy 25</SEAT>
                    <RD>Dummy 07</RD>
                    <RDSEC>Dummy 08</RDSEC>
                    <RDBR>Dummy 09</RDBR>
                    <RDSUBBR>Dummy 10</RDSUBBR>
                    <PRM>Dummy 14</PRM>
                    <POM>Dummy 15</POM>
                </Address>
            </Location>
            <Location>
                <SystemLocation>Yes</SystemLocation>
                <ID>3</ID>
                <Name>loc1</Name>
                <Address>
                    <country>US</country>
                </Address>
            </Location>
        </ws_object>
    </data>
</response>
```

3.2.3.2 Failure

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <Location>
           There are no Locations defined on this PBX
            </Location>
        </ws_object>
    </data>
</response>
```

3.2.4 Extension Registration Subscription Confirmation

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <ExtnSubscription>Subscribed to extension
registrations</ExtnSubscription>
        </ws_object>
    </data>
</response>
```

If the API is already subscribed and requests subscription the response is as above except;

```
<ExtnSubscription>Already subscribed to extension
registrations</ExtnSubscription>
```

3.2.5 Extension Registration UnSubscribe Confirmation

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <ExtnSubscription>Unsubscribed from extension
registrations</ExtnSubscription>
        </ws_object>
    </data>
</response>
```

If the API was not subscribed (or already unsubscribed) and requests unsubscription, the response is as above except; `<ExtnSubscription>Already unsubscribed from extension registrations</ExtnSubscription>`

3.2.6 Set Dynamic Location

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
```

```
    <data>
        <ws_object>
            <Result>Set Dynamic Location
DF3C0600947611DE80E7080027DDD1F2 2</Result>
        </ws_object>
    </data>
</response>
```

When the set fails the Result is as follows; `<Result>Set Dynamic Location Invalid Extn GUID or Loc ID</Result>`

3.2.7 Not Implemented

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <NG911Info>Not implemented</NG911Info>
        </ws_object>
    </data>
</response>

<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <NG911Subscription>Not implemented</NG911Subscription>
        </ws_object>
    </data>
</response>
```

3.3 Events

These messages come from the IP Office when actions occur and without prompting from the API. They are not buffered if the link is not active.

Message	Meaning
Emergency Call Notification	sent whenever an emergency call is initiated on IP Office, regardless of whether it is successful or not
Extension Registration	sent when a new extension registers to the IP Office, if the external app has requested so
Extension Un-registration	sent when an extension de-registers from the IP Office, regardless whether the external app has requested so or not
Location List	Sent when a new location is added, removed or changed on IP Office. This is also the response to the before mentioned “Get Locations” command
Extension List	Sent when the dynamic location for an extension or all extensions is cleared through a different interface - System Status for example

3.3.1 Emergency Call Notification

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <EmergencyCall>
                <Alarm>
                    <Caption>Emergency call!</Caption>
                    <Location>loc1</Location>
                    <Dialled>112</Dialled>
                    <Called>207</Called>
                    <CallerID>1001</CallerID>
                    <User>
                        <Extension>1001</Extension>
                        <Name>Extn1001</Name>
                    </User>
                    <Extension>1001</Extension>
                    <Id>11201</Id>
                    <TypeInfo>H323</TypeInfo>
                    <IPAddress>C0A82A67</IPAddress>
                    <Mac>CCF954AAECFB</Mac>
                </Alarm>
                <GUID>DF3C0600947611DE80E7080027DDD1F2</GUID>
            </EmergencyCall>
        </ws_object>
    </data>
</response>
```

3.3.2 Extension registration

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <Extension>
                <GUID>DF3C0600947611DE80E7080027DDD1F2</GUID>
                <Extension>1001</Extension>
                <TypeInfo>H323</TypeInfo>
                <HWInfo>
                    <IPAddress>C0A82A67</IPAddress>
                    <Mac>CCF954AAECFB</Mac>
                </HWInfo>
                <StdEmLoc>3</StdEmLoc>
                <DynEmLoc>0</DynEmLoc>
            </Extension>
        </ws_object>
    </data>
</response>
```

3.3.3 Extension de-registration

```
<?xml version="1.0" encoding="utf-8"?>
<response status="1">
    <data>
        <ws_object>
            <Extension>
                <Connected>No</Connected>
                <GUID>DF3C0600947611DE80E7080027DDD1F2</GUID>
            </Extension>
        </ws_object>
    </data>
</response>
```

3.3.4 Location List

Output is the same regardless of change. An update of configured locations is sent out to the application, same output as Get Locations command - See section3.2.3.1

3.3.5 Extension List

After clearing dynamic location for an extension or all extensions, from System Status for example, the IP Office sends the "Get Extensions" response - See section3.2.2.1

3.4 XML Definitions

3.4.1 Node Information

Comments		
<NodeInformation>		
	<NodeName>	IP Office System Name
	<NodeAddress>	LAN1 or LAN2 IP Address the API is connected to - currently 8 Hex digits. In future this may be dotted decimal for IPv4 addresses or colon formatted HEX for IPv6
	<VersionType>	Firmware Version, currently a.b.c.d.e format
	<NodeState>	For nodes other than the one the API is connected to - is it currently visible to this node. After a long period a down node will drop off the list.
	<Extension>	In the Hello response a list of extensions, and details, for this node
	<Location>	In the Hello response a list of Locations for this node

3.4.2 Extension List

Comments			
<Extension>			Extension Record One per registered extension.
	<GUID>		Internal Unique Reference
	<Extension>		Base Extension Number - Optional
	<TypeInfo>		Extension Type - also used in the Alarm POTS

			TDM SIPDECT DECT SIP H323
	<HWInfo>		Following section depends on type
<TypeInfo>=POTS, TDM			
		<Card>	Base Card Number - or
		<Module>	Expansion Module Number
		<Port>	Socket number on the hardware
<TypeInfo>=H323, DECT, SIP, SIPDECT			
		<IPAddress>	IP Address Currently 8 Hex digits. In future this may be dotted decimal for IPv4 addresses or colon formatted HEX for IPv6
		<Mac>	MAC address as received in registration
	<StdEmLoc>		Configured Location
	<DynEmLoc>		Current Dynamic Location 0=none
	<Connected>		Is the Extension connected - only sent when it isn't

3.4.3 Location

			Comments
<Location>			
	<ID>		Location ID
	<Name>		Location Name
	<SystemLocation>		Optional - this is the System location (default)
	<Address>		If any Address element is configured
		<country>	Required
		<A1>, <A2>, <A3>, <A4>, <A5>, <A6>, <PRD>, <POD>, <STS>, <HNO>, <HNS>, <LMK>, <LOC>, <NAM>, <PC>, <BLD>, <UNIT>, <FLR>, <ROOM>, <PLC>, <PCN>, <POBOX>, <ADDCODE>, <SEAT>, <RD>, <RDSEC>, <RDBR>, <RDSUBBR>, <PRM>, <POM>	RFC 4119 and RFC 5139 elements, present if configured

3.4.4 Emergency Call Alarm

The alarm is documented in " Description of Emergency Call Alarm Introduced in Release 10.0" see References.

			Comments

<EmergencyCall>				
	<Alarm>			Copy of the alarm sent to E-Mail, SNMP, Syslog but XML formatted
		<Caption>		Fixed String "Emergency call!"
		<Location>		Location Name May be blank
		<Dialled>		Dialled number
		<Called>		Called Number
		<CallerID>		CallerID sent
		<Line>		Line ID if the call came over a trunk
		<User>		User Currently associated to this phone
			<Extension>	May be blank
			<Name>	may be "NoUser"
		<Extension>		Extension Base Extension
		<Id>		Extension ID in Config
		<TypeInfo>		Extension Type
		<Card>		As Per Extension List Type Info
		<Module>		
		<Port>		
		<IPAddress>		
		<Mac>		
	<GUID>			Extension GUID

4 References

IP Office Knowledge Base	https://ipofficekb.avaya.com/ knowledgebase/businesspartner/index.html
IP Office Manager Manual	https://ipofficekb.avaya.com/knowledgebase/manager/_frame2.html
Making Use of the Emergency Services Access Enhancements in IP Office Release 9.0/9.1	http://marketingtools.avaya.com/knowledgebase/businesspartner/ipoffice/mergedProjects/manuals/manuals/other/Emergency%20Services%20Access%20Enhancements%20IPO%2090%20and%2091.pdf
Description of Emergency Call Alarm Introduced in Release 10.0	Available via DevConnect
RFC for "A Presence-based GEOPRIV Location Object Format"	http://tools.ietf.org/html/rfc4119
RFC for "Revised Civic Location Format for Presence Information Data Format Location Object (PIDF-LO)"	http://tools.ietf.org/html/rfc5139