



Technical Brief - Busy Lamp Field (BLF)

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The busy lamp field (BLF) feature enables users to monitor the status of lines on remote phones, display remote calling party information, and answer incoming calls to remote phones (directed call pickup). The BLF feature must be supported by your call server and the specific functions will vary with the call server you use.

Relevant RFCs

[RFC 3265 - SIP-Specific Event Notification](#)

[RFC 4235 - An INVITE-Initiated Dialog Event Package for SIP](#)

[RFC 4662 - SIP Event Notification Extension for Resource Lists](#)

Differences in BLF implementations supported

The SPIP and VVX phones support 2 forms of BLF and this information is relevant to UCS releases 3.3 or later.

Resource list BLF - this form is used primarily with the Broadsoft call platform. The server will aggregate all states of the monitored users and provide their status over a single dialog subscription requested by the phone. This then forms the “list” of monitored “resources”.

Within Polycom Voice groups, this is sometimes referred to as “dynamic BLF” because our implementation allowed the monitored users to be updated in realtime on the UI via changes made to the resource list on the server side.

In this form of BLF, the remotely monitored phone is not aware of a BLF subscription as Broadsoft will identify all calling states via dialog traffic to and from that phone and then report the info to the monitoring phone using its BLF subscription.

Changes to the BLF list are updated using Broadsoft’s portal and the appearances on the phone will update in real-time without a reboot.

Key Points:

- **One single Subscribe / Notify dialog for all BLF lines**
- **Cannot use the “automata” type**
- **Updates dynamically on screen with changes**

Multi-subscription BLF – also known as static BLF because the monitored users are statically assigned in the configuration file. Each monitored user represents a separate and unique dialog subscription and changes to any single monitored resource requires a phone restart. This form of BLF is much more configurable and can allow for BLF information to come from a separate server than the call server. This form of BLF is commonly used with the Metaswitch, Genband, Asterisk, SIPx, and homegrown call servers.

Key Points:

- **Each BLF line has its own Subscribe / Notify dialog**
- **Uses both the “Normal” and “Automata” type**
- **Allows much more flexibility in designing on screen location of BLF appearances**

BLF Dialogs – Attribute information

Below is a sample dialog body taken from RFC 4235 section 4.2

```
<?xml version="1.0" encoding="UTF-8"?>
<dialog-info
  xmlns="urn:ietf:params:xml:ns:dialog-info"
  version="26"
  state="full"
  entity="sip:brad.marusiak.15@as-dev.vancouver.polycom.com">
  <dialog
    id="Y2FsbGhhbGYtMzUxNTM1Nzk6MA=="
    local-tag="VePww3"
    remote-tag="DAACA103-8D7359DC"
    direction="initiator">
    <state>proceeding</state>
    <local>
      <identity display="Brad Marusiak 1740">sip:brad.marusiak.15@as-dev.vancouver.polycom.com
      </identity>
      <identity display="Brad Marusiak 1740">tel:+13339951740;ext=1740
      </identity>
      <param pname="sip.rendering" pval="yes" />
    </local>
    <remote>
      <identity display="Paul Johnston 1731">sip:1731@as-dev.vancouver.polycom.com;user=phone
      </identity>
      <target uri=sip:1731@192.168.212.43>
      <param pname="x-sipX-nonat" pval="" />
    </remote>
  </dialog>
</dialog-info>
<dialog id="1" call-id="83c9b657-97210d50-c4c27a71@10.242.16.28" direction="recipient">
```

Version: must update sequentially starting from 0. Allows the phone to detect a missed or out of order NOTIFY message. If we miss a message, the phone should re-SUBSCRIBE so that a new “full state” NOTIFY can be sent.

State: this state will either be partial or full. Full state represents the complete picture for a BLF resource and must replace any state information the phone may be storing. A partial update may only change a couple of pieces of data for one or more monitored resources.

Entity: a URI that identifies the user being reported on, or the “monitored/observed user.

ID, local-tag, remote-tag: These attributes represent the call-id, and tagging of the actual dialog being observed and are used in forming INVITE with replaces messages when intercepting calls via the directed call pickup feature.

Direction: indicates if the local identity is receiving the call or making the call. Required in order to be able to determine if features like directed call pickup can be applied, and to whom.

State	LED state	Description
Terminated	Off	This state is sent when a call is ended and applies to both the initiator and recipient of a call
Trying	n/a	We do not use this state on our phones
Proceeding	Flashing Green	
Early	Flashing Green	
Confirmed	Solid Red	This state indicates an active, held, or other currently confirmed call state. Applies to both the initiator and recipient of a call.

Local & Remote: The local element represents information concerning the actual device or instance making the BLF state update whereas the remote element contains information pertaining to the far end. There are several different elements that can appear within a local or remote element:

- **Identity:** How to display this instance and its global contact address. The global contact address may resolve to more than a single instance such as a desk phone, a PC client, and a mobile client. In practice however, its generally only a single device. There may be more than one identity element. The identity element also contains an optional display attribute that is used for caller-id display.
- **Target:** The "target" contains the local or remote target URI constructed by the user agent for this dialog. It can also contain several parameters in the form of pname/pval attributes. Some example params that Polycom phones use are:
 - isfocus: used to identify the creator of a conference
 - sip.rendering: a yes value indicates that the phone is actively sending RTP, ie: not on hold

Configuration Parameters

The image shows a configuration tree on the left with a folder icon and the name 'attendant' highlighted in blue. Below the folder are several red circular icons representing parameters. To the right of the tree is a list of these parameters and their values, separated by a vertical line.

attendant.uri	
attendant.behaviors.display.spontaneousCallAppearances.automata	0
attendant.behaviors.display.spontaneousCallAppearances.normal	1
call.directedCallPickupMethod	native
call.parkedCallRetrieveMethod	native
attendant.resourceList.1.address	8501
attendant.resourceList.1.type	automata
attendant.resourceList.1.label	Park Orbit 1
attendant.resourceList.2.address	206
attendant.resourceList.2.label	User 206
attendant.resourceList.2.type	normal
attendant.resourceList.3.address	207
attendant.resourceList.3.type	normal
attendant.resourceList.3.label	user 207

The above figure shows a configuration for 3 monitored resources using the static configuration method of BLF. One resource is using the Automata type which designates a behavioural change for that BLF vs the others commonly associated when monitoring IVRs or park orbits.

<i>Parameter</i>	<i>Permitted Values</i>	<i>Default</i>
attendant.reg¹	positive integer	1
<p>The index of the registration that will be used to send a SUBSCRIBE to the list SIP URI specified in <code>attendant.uri</code>. For example, <code>attendant.reg = 2</code> means the second registration will be used. This mainly affects the username/password credentials supplied when challenged.</p>		
attendant.ringType	default, ringer1 to ringer24	ringer1
<p>The ringtone to play when a BLF dialog is in the offering state. We cannot set a unique ringtype for different BLF lines, it is only 1 ringtype applied to all BLF lines.</p>		
attendant.uri¹	string	Null
<p>The resource list SIP URI on the server. If this is just a user part, the URI is constructed with the referenced <code>attendant.reg</code> server's hostname/IP.</p> <p><i>Note:</i> If this parameter is set, then the individually addressed users configured by <code>attendant.resourceList</code> are ignored.</p>		
attendant.behaviors.display.spontaneousCallAppearances.normal¹	0 or 1	1
attendant.behaviors.display.spontaneousCallAppearances.automata¹	0 or 1	0
<p>If 1, the call appearance is spontaneously presented to the attendant on the phone UI when calls are alerting on a monitored resource (and a ring tone is played). If 0, the call appearance is suppressed and no attendant ringtone is played leaving only the line LED and icon to indicate the call. The information displayed after a press-and-hold of a resource's line key is unchanged by this parameter. When BLF is configured using <code>attendant.uri</code>, only the value of <code>attendant.behaviors.display.spontaneousCallAppearances.normal</code> is available for use.</p>		
attendant.behaviors.display.remoteCallerID.normal¹	0 or 1	1
attendant.behaviors.display.remoteCallerID.automata¹		
<p>If 1, normal and automata remote party caller ID information is presented to the attendant. If 0, the string <code>unknown</code> will be substituted for both name and number information.</p>		

<i>Parameter</i>	<i>Permitted Values</i>	<i>Default</i>
attendant.resourceList.x.address¹	string that constitutes a valid SIP URI (sip:6416@polycor.com) or contains the user part of a SIP URI (6416)	Null
<p>The user referenced by <code>attendant.reg=""</code> will subscribe to this URI for dialog. If only a user part is present, the phone will subscribe to a sip URI constructed from the user part and domain of the user referenced by <code>attendant.reg</code>.</p>		
attendant.resourceList.x.callAddress¹	string	Null
<p>If the BLF call server is not at the same address as the BLF presence server, the associated BLF linekey when used as a speed dial will route via this address instead of the address specified by <code>attendant.resourceList.x.address</code>. This address is ignored for call pickup when <code>call.directedCallPickupMethod</code> or <code>call.parkedCallRetrieveMethod</code> is set to "native".</p>		
attendant.resourceList.x.label¹	UTF-8 encoded string	Null
<p>The text label displays adjacent to the associated line key. If set to Null, the label will be derived from the user part of <code>attendant.resourceList.x.address</code>.</p>		
attendant.resourceList.x.proceedingsIsRecipient¹	0 or 1	0
<p>A flag to determine if pressing the associated line key for the monitored user will pick up the call. This is only to be used in cases where the BLF signaling provided to the phone does not include the required "recipient" xml attribute.</p>		
attendant.resourceList.x.type¹	normal or automata	normal
<p>The type of resource being monitored and the default action to perform when pressing the line key adjacent to monitored user <i>x</i>. If <code>normal</code>, the default action is to initiate a call if the user is idle or busy and to perform a directed call pickup if the user is ringing. Any active calls are first placed on hold. If <code>automata</code>, the default action when is to perform a park/blind transfer of any currently active call. If there is no active call and the monitored user is ringing/busy, an attempt to perform a directed call pickup/park retrieval is made</p>		
volpProt.SIP.strictReplacesHeader	0 or 1	1
<p>This parameter applies only to directed call pick-up attempts initiated against monitored BLF resources. If set to 1, the phone requires call-id, to-tag, and from-tag to perform a directed call-pickup when <code>call.directedCallPickupMethod</code> is configured as native. If set to 0, call pick-up requires a call id only.</p>		

<i>Parameter</i>	<i>Permitted Values</i>	<i>Default</i>
voipPort.SIP.useCompleteUriForRetrieve	0 or 1	1
<p>If set to 1, the target URI in BLF signaling will use the complete address as provided in the xml dialog document.</p> <p>If set to 0, only the user portion of the target URI in the XML dialog document is used and the current registrar's domain is appended to create the address for retrieval.</p>		
voipProt.SIP.useLocalTargetUriForLegacyPickup	0 or 1	1
<p>Included as of UCS 4.0.4, 4.1.5, and 5.0.0</p> <p>If set to 1, the target URI in BLF signaling will use the complete address as provided in the xml dialog document.</p> <p>If set to 0, only the user portion of the target URI in the XML dialog document is used and the current registrar's domain is appended to create the address for pickup or retrieval.</p>		
call.directedCallPickupMethod¹	native or legacy	Null
<p>Specifies how the phone will perform a directed call pick-up from a BLF contact. native indicates the phone will use a native protocol method (in this case SIP INVITE with the Replaces header). legacy indicates the phone will use the method specified in <code>call.directedCallPickupString</code>.</p>		
call.directedCallPickupString¹	star code	*97
<p>The star code to initiate a directed call pickup. <i>Note:</i> The default value supports the BroadWorks calls server only. You must change the value if your organization uses a different call server.</p>		
call.parkedCallRetrieveMethod¹	native or legacy	Null
<p>The method the phone will use to retrieve a BLF resource's call which has dialog state confirmed. native indicates the phone will use a native protocol method (in this case SIP INVITE with the Replaces header). legacy indicates the phone will use the method specified in <code>call.parkedCallRetrieveString</code></p>		
call.parkedCallRetrieveString¹	star code	Null
<p>The star code used to initiate retrieval of a parked call.</p>		

¹ Change causes phone to restart or reboot.

Parameter Highlight

Non-RFC compliant implementations

A common interoperability issue when using BLF stems from non-RFC compliant devices using a variety of custom fields or omitting required fields. Added in UCS 4.0.4, 4.1.5, and 5.0.0, the

`voIpProt.SIP.useLocalTargetUriForLegacyPickup`

allows a more fine grained control of addresses used in Directed Call Pickup and Call Park retrieve.

Assume the following is configured:

```
voIpProt.server.1.address="Polycom.com"  
call.directedCallPickupString="*97"  
call.directedCallPickupMethod="legacy"
```

When a dialog NOTIFY is received with a body content containing:

```
<dialog-info xmlns="urn:ietf:params:xml:ns:dialog-info" version="0"  
state="full" entity="sip:206@10.242.16.10">  
<local>  
  <identity display="User A">sip:AAAAA@server1.com</identity>  
  <target uri="sip:BBBB@server2.com"></target>  
</local>
```

The Pickup request will depend on the interaction of these two parameters

<i>Pickup Request</i>	<i>useCompleteUriForRetrieve</i>	<i>useLocalTargetUriForLegacyPickup</i>
*97BBBB@server2.com	1	1
*97AAAA@server1.com	1	0
*97BBBB@Polycom.com	0	1
*97AAAA@Polycom.com	0	0

Directed Call Pickups

We support two methods of performing a Directed Call Pickup (DCP), native or legacy. When a device signals that it is receiving a call using a BLF dialog NOTIFY, where and how you send the pickup request can vary.

Legacy

Legacy refers to older telephony use of star codes as are commonly seen on Broadsoft. When using star codes, the star code followed by an extension are sent to the server and then the server strips the star code as a hint for how to handle the message. Generally these star codes never see the far end device and the call control platform will manipulate the dialog using re-INVITEs or REFERs to direct the call.

When using the Legacy method to perform a DCP, the star code should be followed by the extension of the LOCAL element. This tells the call server which device is ringing and allows the call server to redirect the device sending the star code with the ringing phones connection info.

Key Point: Star code pickup sends INVITE to the *local address*.

Native

Native refers to a method using native SIP constructs and doesn't rely on a B2BUA in the call server manipulating SDP or call flows. When performing a Native pickup, the pickup request is sent all the way to the far end device that has indicated it is ringing. That device, upon receiving the pickup request, will use the "replaces" SIP header to construct a REFER to send out to whichever device had sent the call so that it can redirect its own call to the device making the pickup.

Key Point: Native pickup sends the INVITE to the *remote address* .

BLF Examples using WireShark Captures

Capture: Monitored_call_completes.pcapng

Use case: a call to a monitored user is answered and ended without interaction by the monitoring station

Frame #	Annotations
7	Subscription for dialog event notification for user 206
8	200 OK, the subscription is now active and expires in 3600 seconds
9	User 206 sends a NOTIFY with the dialog state. The message body show that user 206 is idle and the version of the dialog document is 0.
11	NOTIFY from 206 indicating that an inbound call has arrived from user 210. 206 is currently ringing (state=early). The dialog document version has incremented to 1 and the dialog information such as tags, and call-id are provided
13	NOTIFY from 206, the dialog state has transitioned to ‘confirmed’ meaning 206 has answered the call. The “+sip.rendering” parameter is set to “yes” indicating that the call is active and 206 is sending RTP. Had it been set to “no” that would indicate that the call is connected but 206 has placed the far end on hold. Note: There is no indicator in BLF dialog information to indicate that 206 might be ‘held’ unless the monitoring phone also is receiving updates from the far end as the state would remain set to confirmed and the rendering value would not change
15	NOTIFY from 206, the call has ended and the dialog has been terminated. As there are no other dialogs for 206, that device is now idle

Capture: directed_pickup_park_then_retrieve.pcap

Use case: a caller from another office (user 210) dials extension 206 who is not in today. The user at 209 is monitoring their station using BLF however and can see that their line is ringing. They perform a 1-touch directed call pickup to intercept the call from 210 and after a brief discussion places 210 on hold by moving them to a park orbit which provides music on hold while they research an answer. User 209 then retrieves the call from the park orbit, answers their question and terminates the call.

Frame #	Annotations
5-10	Subscription for dialog event notification for the resource at 8501 – This is a Park orbit
11-20	Subscription for dialog event notification for the resource at 206 – this is a normal user
21-30	Subscription for dialog event notification for the resource at 207 – this is a normal user
31	INVITE from user 210 to user 206
41	BLF NOTIFY from user 206 indicating they are in the early state (ringing)
50	User 209, the monitoring phone, presses the “pickup” softkey or single presses the linekey associated with the flashing green LED of the ringing monitored user 206. An INVITE with Replaces formed from the data in the received BLF NOTIFY above creates the directed call

	pickup of the call from user 210 by 209.
54	210 automatically CANCELS the original call to 206 as it has been replaced by the call from 209
62	BLF NOTIFY from user 206 that the call has ended and that it has returned to idle
64	Automatic 200 OK from 210 to accept the INVITE replacing the call to user 206
71	User 209 single presses the line key associated with the Park orbit at 8501 to park the current call from 210. This INVITE places 210 on hold temporarily
78	This REFER completes the one touch park by 209 by blindly referring 210 to the park orbit at 8501
82	210 creates the call to the park orbit which automatically answers and plays media
88	Notification that the referred call has completed
95	BLF NOTIFY from the park server that it has a call. Note: although the call is connected, the park server sends a dialog state of 'early' rather than 'confirmed'. This allows an RFC legal directed call pickup to be made by 209 to retrieve the call from the park orbit.
103	User 209 single presses the line key associated with the park orbit to retrieve the call from user 210. This triggers an INVITE with replaces formed from the information in the NOTIFY from frame #95.
110	210 automatically accepts the INVITE from 209 and sends a 200 OK
112	The Park Orbit sends a final BLF NOTIFY to indicate it is once again idle
118	The call is ended by user 209

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