SBC 1000 / SBC 2000 Series Configuration Guide
(For Microsoft Lync Server 2013)

For use with AT&T's IP Flexible Reach – Enhanced Features Service on
MIS, MPLS PNT or AT&T VPN
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1. Introduction

This document provides a configuration guide for Sonus SBC 1000 / SBC 2000 Series (Session Border Controller) when connecting to AT&T IPFR-EF service using AVPN or MIS/PNT transport.

This configuration guide supports basic and enhanced IP Flexible Reach features. The below list gives the IP Flexible Reach - Enhanced Features (IPFR-EF) verified using this configuration guide. The complete list of IPFR-EF features can be found in AT&T IP Flexible Reach service guide at http://new.serviceguide.att.com

- Network Based Sequential Ring
- Network Based Simultaneous Ringing
- Network Based Call Forwarding Always
- Network Based Call Forwarding Busy
- Network Based Call Forwarding Not Reachable
- Network Based Call Forwarding No Answer

The Sonus SBC 1000 / SBC 2000 is a Session Border Controller that connects disparate SIP trunks, SIP PBXs, and communication applications within an enterprise. It can also be used as a SIP routing and integration engine. The Sonus SBC is the point of connection between the Microsoft Lync Server and AT&T IPFR-EF service and is used not only to secure the SIP trunk, but also to make adjustments to carrier and enterprise signaling for interoperability.

Note: This guide supports SBC 1000/2000 Series configurations for releases V3.0.2 or higher

1.1. Special Notes

1.1.1. Emergency 911/E911 Services Limitations and Restrictions

Emergency 911/E911 Services Limitations and Restrictions - Although AT&T provides 911/E911 calling capabilities, AT&T does not warrant or represent that the equipment and software (e.g., IP PBX) reviewed in this customer configuration guide will properly operate with AT&T IPFR-EF to complete 911/E911 calls; therefore, it is Customer’s responsibility to ensure proper operation with its equipment/software vendor.

While AT&T IPFR-EF services support E911/911 calling capabilities under certain Calling Plans, there are circumstances when that E911/911 service may not be available, as stated in the Service Guide for AT&T IPFR-EF found at http://new.serviceguide.att.com. Such circumstances include, but are not limited to, relocation of the end user’s CPE, use of a non-native or virtual telephone number, failure in the broadband connection, loss of electrical power, and delays that may occur in updating the Customer’s location in the automatic location information database. Please review the AT&T IPFR-EF Service Guide in detail to understand the limitations and restrictions.

1.1.2. N11 Call Support

Microsoft Lync prepends a “+” (plus sign) to all dialed numbers including N11 calls (211/311/411/511/611/711/811/911). The SBC1000/SBC2000 must be configured to remove the “+” from the Request URI in the INVITE message for N11 calls. The AT&T Flex Reach Service will not complete a call with the format “+N11”. The SBC1000/SBC2000 must
be configured to remove the “+” from the Request URI in the INVITE message for N11 calls. See Section 2.1.5.2 for more details.

1.1.3. **Lync 2013 Call Forward Support**

The SBC1000/SBC2000 must be configured to add a “Diversion” header to all outgoing 8YY calls to AT&T Flexible Reach.

The AT&T network requires that a known AT&T 10 digit TN be signaled as the Calling Number in the “Diversion”, P-Asserted-Identity, or “From” header. Since Microsoft Lync does not provide a “Diversion” or “P-Asserted-Identity” header the SBC1000/SBC2000 must be configured to add a “Diversion” header with a valid AT&T 10 digit TN. This global additional header is necessary because calls forwarded by Lync will otherwise not contain a known AT&T 10 digit TN. See section 2.1.5.1 for details.

1.1.4. **Lync 2013 Conference with AT&T IP Teleconferencing Service**

Participants in a Lync conference call cannot interact with the AT&T IP Teleconferencing Service. This occurs because the Lync Conference does not generate DTMF tones or 2833 packets. An example of a problematic call scenario is as follows: Three Lync Clients (A, B and C) join a Lync Conference Call or Group Conversation. The Lync Conference (or Group Conversation) dials the 8YY access number for the AT&T IP Teleconferencing Service. This call will fail because it is not possible to signal the requested User ID and PIN code to the AT&T IP Teleconferencing Service.

The workaround for this issue is to have the three individual Lync clients (A, B, and C) each separately call into the AT&T IP Teleconferencing Service. Lync client A calls the 8YY access number for the AT&T IP Teleconferencing Service and enters the necessary User ID and PIN code. Lync client B calls the 8YY access number for the AT&T IP Teleconferencing Service and enters the necessary User ID and PIN code. Lync client C calls the 8YY access number for the AT&T IP Teleconferencing Service and enters the necessary User ID and PIN code.

This is a known and documented Lync Issue.

http://support.microsoft.com/default.aspx?scid=kb;en-us;2254369&sd=rss&spid=12605

Article ID: 2254369 - Last Review: October 28, 2010 - Revision: 8.0

Participants in a conference call that is hosted by Audio Video Multipoint Conferencing Unit (AVMCU) using Microsoft Lync Server 2013 or Microsoft Office Communications Server 2007 R2 cannot add attendees to the conference if those attendees require Dual Tone Multi Frequency (DTMF) tones to join the conference.

1.1.5. **AT&T Network Based Call Transfer – Not Supported**

Microsoft Lync Server 2013 is incompatible with the AT&T Network Based Call Transfer feature. The SIP REFER message sent by Microsoft Lync is not acceptable to the AT&T IP Flexible Reach network.
1.1.6. Calling Number Privacy

Lync Server 2013 does not signal Calling Number Privacy. The SBC can be configured to modify the SIP Signaling messages from Lync to provide the Calling Number Privacy feature. Section 2.1.5.3 shows how to configure the SBC to perform Calling Number Privacy.
1.2. Network Topology

Sonus SBC2000/SBC1000 With Lync Server 2013 to AT&T Flexible Reach

The figure above represents the equipment that was used for the IPFR-EF certification.

1.3. Hardware/Software Configuration

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sonus SBC 1000 / SBC 2000 Series</td>
<td>Version 3.0.2 Build 265 or later</td>
</tr>
<tr>
<td>Third-party Equipment</td>
<td></td>
</tr>
<tr>
<td>Microsoft Lync Server 2013</td>
<td>5.0.8308.0</td>
</tr>
</tbody>
</table>
2. SBC 1000 / SBC 2000 Series Configuration

2.1.1. Prerequisites
The following will be required to complete the configuration of the SBC SIP Trunk Task:

1. FQDN of the Lync 2013 Mediation Server or Server pool
2. IP Address(s) of the AT&T Border Elements
3. FQDN of the SBC
4. If TLS will be used between the SBC and Lync 2013 Server(s). Access to the Certificate Authority to download the root certificate and sign and download the user certificate for the proper TLS operation between the SBC and the Lync 2013 Server(s)

2.1.2. SBC Initial Task configuration
Configuring the SBC 2000 / SBC 1000 is done through the SBC’s integrated web server. This guide assumes that the operator has already done the initial configuration positioning the SBC on the IP network. To start the configuration process, use a standard web browser to connect to the IP or FQDN address of the SBC. Supply the username and password to complete the login process.
The Initial Task configuration is a step by step process that will complete the steps to position the SBC between AT&T’s SIP Trunk and Microsoft’s Lync Server 2013. This task will create SIP components and call routing basics.

Using a web browser navigate to the Task tab and click on the ‘Microsoft UC Setup/Lync Setup’ link on the left pane.
Click on the last tab ‘Lync Setup’ to configure the SIP Endpoints in the SBC. This process will setup the SBC to interface to the AT&T Flexible Reach SIP Trunk and to the Lync Server(s). The task will configure the SIP Server tables and the SIP Signaling groups associated with each entity along with the basic routing between each endpoint.
Scenario Description:
Provide a description that will associate to the setup of the SIP Trunk. (Ex. ATT Lync)

Gateway Scenario:
Select from the dropdown “SIP Trunking”

Emergency Services:
Select from the dropdown “None”

No of Channels:
Provide the total number of simultaneous calls you have purchased from AT&T. (Ex. 30)

Server Pool Host:
The FQDN of the Lync Server or Server pool that the SBC will communicate with. (Ex. Lync2013fe.honig.net)

Port Number:
The IP Port that the Lync Server or Server pool listens on for SIP messages from the SBC. (Ex. 5060)

**Border Element Server:**
IP or FQDN Address of the AT&T IP Border Element that the SBC will communicate with. (Ex. 12.194.20.88)

**Protocol:**
Select from the dropdown “UDP”.

**Port Number:**
The IP Port that the AT&T Border Element listens on for SIP messages from the SBC. (Ex. 5060)

**Use Secondary Border Element Server:**
Select “Enabled” from the dropdown if a secondary AT&T Border Element will be configured.

**Secondary Border Element Server:**
IP or FQDN Address of the secondary AT&T IP Border Element that the SBC will communicate with. (Ex. 12.194.19.88)

**Protocol:**
Select from the dropdown “UDP”.

**Port Number:**
The IP Port that the secondary AT&T Border Element listens on for SIP messages from the SBC. (Ex. 5060)

Once the page has been configured click ‘Apply’ to finish the dialog.

### 2.1.3. SBC Configuring SIP Server Tables

The “Lync Setup Task” performed in Section 2.1.2 should have created “SIP Server Table” entries for Lync and the AT&T Border Elements. Confirm that the SIP Server Tables are configured as show below. From the Settings Tab/SIP/SIP Server Tables expand each table by clicking the ▶ symbol.

Insure that there are two entries in the AT&T Border Element Table for the Primary and Secondary Border Elements.
Insure that the table entry for the Primary AT&T Border Element has a higher Priority than the Secondary Border Element and the Protocol is set to UDP.
2.1.4. SBC Configuring Transformation Tables

Transformation tables are used to modify the called and calling party information elements among other elements that are pertinent to proper call handling between the origination and destination servers. The basic transformations rely on the use of Regular Expressions as the numbers/names are changed from what is received to what is sent to the destination. Transformation tables can be configured as Optional or Mandatory to provide maximum flexibility in modification of signalling elements.

2.1.5. Lync to AT&T Transformations Required

2.1.5.1. Adding Diversion Header using Transformation Table

As indicated in Section 1.1.3 all 8YY calls signalled to AT&T Flex Reach need a “Diversion” header with a valid AT&T 10 digit Telephone Number (TN). The following SBC Transformation Table Entry must be created to add the “Diversion” header to the SIP INVITE message sent to AT&T. Substitute one of your valid AT&T 10 digit Telephone Numbers for the value 12142592198 shown below.

2.1.5.2. Additional Transformation Table

Below is a list of additional Transformation Table entries that are used to remove “+” from the Called and Calling Number and support the AT&T Dial Plan for Activating and Deactivating Enhanced Calling Features (ex. Call Forward Activate = *72+PSTN).  
## Transformation Entry Row

<table>
<thead>
<tr>
<th>Admin State</th>
<th>Input Field Type</th>
<th>Input Field Value</th>
<th>Output Field Type</th>
<th>Output Field Value</th>
<th>Match Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>+(.*)</td>
<td>Called Address/Number</td>
<td>\1</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>+(.*)</td>
<td>Calling Address/Number</td>
<td>\1</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>+(.*)</td>
<td>Called Address/Number</td>
<td>\1</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>1800(.*),</td>
<td>Redirecting Number</td>
<td>12142592198</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>1800(.*),</td>
<td>Redirecting Number</td>
<td>12142592198</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>1800(.*),</td>
<td>Redirecting Number</td>
<td>12142592198</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>1877(.*),</td>
<td>Redirecting Number</td>
<td>12142592198</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>1877(.*),</td>
<td>Redirecting Number</td>
<td>12142592198</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>1855(.*),</td>
<td>Redirecting Number</td>
<td>12142592198</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>\72(.*),</td>
<td>Called Address/Number</td>
<td>*72\1</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>\72(.*),</td>
<td>Called Address/Number</td>
<td>*72\1</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>\90(.*),</td>
<td>Called Address/Number</td>
<td>*90\1</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>\91</td>
<td>Called Address/Number</td>
<td>*91</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>\94(.*),</td>
<td>Called Address/Number</td>
<td>*94\1</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>\95</td>
<td>Called Address/Number</td>
<td>*95</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>\92(.*),</td>
<td>Called Address/Number</td>
<td>*92\1</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>Called Address/Number</td>
<td>\93</td>
<td>Called Address/Number</td>
<td>*93</td>
<td>Optional</td>
</tr>
</tbody>
</table>

![Configuration Interface](image-url)
Configuring SBC for Calling Number Privacy

Lync does not signal Calling Number Privacy. The SBC can be configured to modify the SIP Signaling messages from Lync to provide the Calling Number Privacy feature. Modify the SIP Signaling Profile as shown below to Signal Calling Number Privacy.

2.1.6. AT&T to Lync Transformations Required

Below is a list of additional Transformation Table entries that are used on SIP messages passing from the AT&T SIP Trunk to Lync 2013. The first transformation adds a “+1” to the Called Address Number. The second transformation is used by a SIP Message Manipulation Rule to modify the SDP in an initial INVITE from “a=inactive” to “a=sendrecv”.

The following SIP Message Manipulation Rule and Condition Rule are used to evaluate INVITE messages from AT&T and modify the SDP when necessary.
The Message Manipulation Rule is then applied to the SIP Signaling Group facing Lync as shown below.

2.1.7. **SBC Configuring Media Transcoding**

The AT&T IP Flexible Reach Service has Media preferences for Codecs, Digit Relay and RTCP. A SBC Media List should be configured as shown below for use with AT&T IP Flexible Reach.
The Lync Mediation Server has preferences for Codecs, Digit Relay and RTCP. A SBC Media List should be configured as shown below for use with Lync.
2.1.8. SBC Call Routing Process
The call routing process in the SBC moves calls received on one Signaling Group (SG) to an outbound SG. While the call is moving the number or name may be translated and additional lookups can be done to ensure the call is routed properly.
Below are the settings for the Signaling Group that must be configured to face AT&T:

- **Description**: ATT SIP Trunk
- **Admin State**: Enabled
- **Service Status**: Up

**SIP Channels and Routing**

- **Action Set Table**: None
- **Call Routing Table**: To Mediation Server or FAX
- **No. of Channels**: 60 (2,960) *
- **SIP Profile**: AT&T SIP Profile
- **SIP Mode**: Basic Call
- **SIP Server Table**: Border Element Servers
- **Load Balancing**: Priority

**Media Information**

- **Media List ID**: AT&T SIP Trunk Media List
- **Play Ringback**: Auto
- **Tone Table**: Default Tone Table
- **Early 183**: Disable
- **Music on Hold**: Disabled

**Mapping Tables**

- **SIP To Q.950 Override Table**: Default (RFC4497)
- **Q.950 To SIP Override Table**: AT&T Enhanced Features
- **Pass-thru Peer SIP Response Code**: Disable

**SIP IP Details**

- **SIP Source IP**: Auto
- **SIP DSCP**: 40 (8021)
- **NAT Traversal**: None

**Listen Ports**

- **Total 2 SIP Listen Port Rows**
- **Port**: 5060
  - **Protocol**: UDP
  - **TLS Profile ID**: N/A
- **Port**: 5061
  - **Protocol**: TCP
  - **TLS Profile ID**: N/A

**Federated IP/FQDN**

- **Total 2 SIP Federated IP Rows**
- **IP/FQDN**: 12.194.20.68
  - **Netmask**: 255.255.255.255
- **IP/FQDN**: 12.194.18.68
  - **Netmask**: 255.255.255.255

**Message Manipulation**: Disabled
Below are the settings for the Signaling Group that must be configured to face Lync.
3. Microsoft Lync 2013 Configuration

Lync Server 2013 will need to be configured to support the SBC in order to communicate with the AT&T Flexible Reach Service. This section covers the addition of the SBC into the Lync Server topology and adding the SBC to the Lync Server 2013 routing. AT&T Flexible Reach Telephone Numbers will be assigned to a Lync user accounts. This section assumes that the Lync Server components have been installed along with Lync users. The user should be familiar with Lync Server Topology Builder, Lync Server Control Panel and Lync Server management Shell. This section does not cover the basic installation of Lync Server 2013.

The Lync Server topology needs to be modified by adding the SBC as a Gateway device. The Gateway device will be the interface to the AT&T Flexible Reach SIP Trunk.

Open Lync Server Topology builder and load the current topology. Expand the topology and Right Click on the ‘PSTN Gateways’ link in the left hand pane. Select “New IP/PSTN Gateway…” from the Menu as shown below:
Define the PSTN Gateway FQDN

Define the fully qualified domain name (FQDN) for the PSTN gateway.

FQDN: 
sbc2000.honig.net
Define the IP address

Enable IPv4
- Use all configured IP addresses.
- Limit service usage to selected IP addresses.

PSTN IP address:

Enable IPv6
- Use all configured IP addresses.
- Limit service usage to selected IP addresses.

PSTN IP address:
3.1.1. Adding the SBC into Lync Server Routing

In order for Lync Server 2013 to send calls to the AT&T IP Flexible Reach SIP Trunk the SBC will have to be added to the Routing. Open Lync Server Control Panel and click on the Voice Routing link on the left hand pane. Click on the Route tab on top of the right hand pane to show the dialog below:
Ensure the SBC is highlighted in the dialog and click “OK’.

At this point commit these changes to the topology.

**MS Lync Configuration for Enhanced IP Flexible Reach Service**

The AT&T Enhanced IP Flexible Reach Call Forwarding features are initiated by the Lync client calling Activation and Deactivation numbers. The Activation and Deactivation dial numbers (Feature Access Codes) begin with an asterisk “*” and contain two or more digits. The Lync Server Dial Plan and Routing must be configured to properly process the AT&T Enhanced IP Flexible Reach Feature Access Codes. The Table below is a sample of the AT&T Feature Access Codes (FAC) that must be supported by Lync. The complete list of AT&T Feature Access Codes can be obtained from the AT&T web site.

https://www.wireless.att.com/businesscenter/msites/support/ipflex/enterprise-admin/manage-group-fac.jsp
<table>
<thead>
<tr>
<th>Calling Feature</th>
<th>Default Feature Access Code</th>
<th>SIP Error Code / Error Condition that triggers the feature</th>
</tr>
</thead>
</table>
| Call Forwarding – Always | Activation:  *72 (followed by the forwarded number)  
                        Deactivation:  *73 | Not Applicable                                           |
| Call Forwarding – Busy    | Activation:  *90 (followed by the forwarded number)  
                        Deactivation:  *91 | SIP 486 Busy Here                                        |
| Call Forwarding - Ring/No Answer | Activation:  *92 (followed by the forwarded number)  
                        Deactivation:  *93 | Timeout by AT&T network after 20 seconds                |
| Call Forwarding – Not Reachable | Activation:  *94 (followed by the forwarded number)  
                        Deactivation:  *95 | SIP 403 Forbidden                                        |

The screen shot below shows the Dial Plan Normalization Rules that must be configured within Lync to support the AT&T Feature Access Codes.
Insure that the Lync Routing Plan will accept the AT&T Feature Access Codes. The Routing Plan example below is configured to accept all character strings (\*).
4. Troubleshooting

Assistance for troubleshooting can be obtained by calling the Sonus TAC center at 1-888-391-3434.

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