



# OfficeMaster SBA

(Survivable Branch Appliance)

Resilient branch office solution  
for Microsoft® Lync™ Server 2010

December 2010  
Based on Lync RTM (4.0.7577.0)

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## 1 Introduction

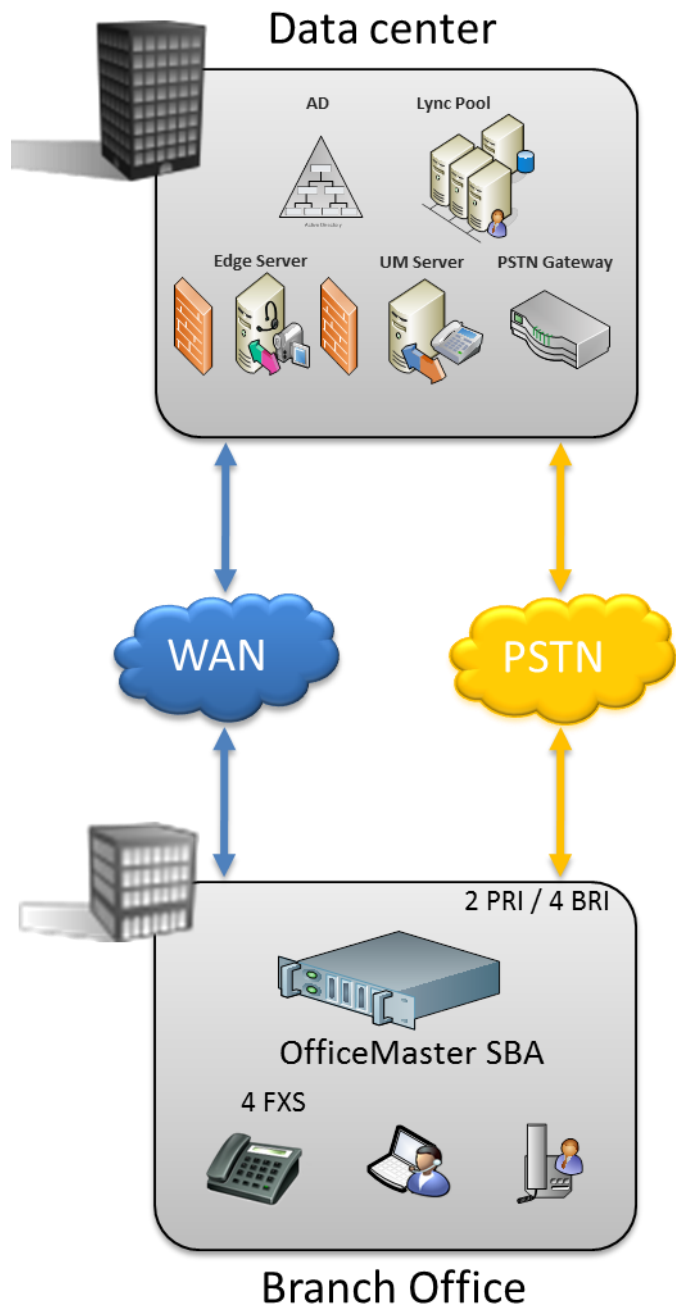
With current versions of Microsoft Office Communications Server (Wave 12, Wave 13) it is possible to share a centralized deployment of call management with users working in remote offices. This is very cost-effective but has one important drawback: If wide area network is not available, branch offices are disconnected from telephony services.

Microsoft Lync Server 2010 is the first version that will support remote site telephony even on WAN outages. Microsoft has defined an appliance type of products containing all functions needed for telephony in a branch offices; therefore called "Survivable Branch Appliance" (SBA).

"OfficeMaster SBA" is based on high quality industry grade server hardware (HP ProLiant) which runs Windows Server 2008 R2 together with Microsoft branch office components like Registrar and Mediation Server.

A separate PCI-Express card contains the complete media gateway which supports different types of ISDN connections – four basic rate interfaces (BRI) supporting 8 ports and up to 60 channels of E1/T1 primary rate (PRI) connections. Four analog FXS ports are available through an additional low profile PCIe card. If more ports are needed, separate external devices can be added. In addition, support for SIP trunks will be available as an update. The gateway board is seen by the hosting server machine as a standard network interface card – all gateway functions are completely offloaded from the main CPU.

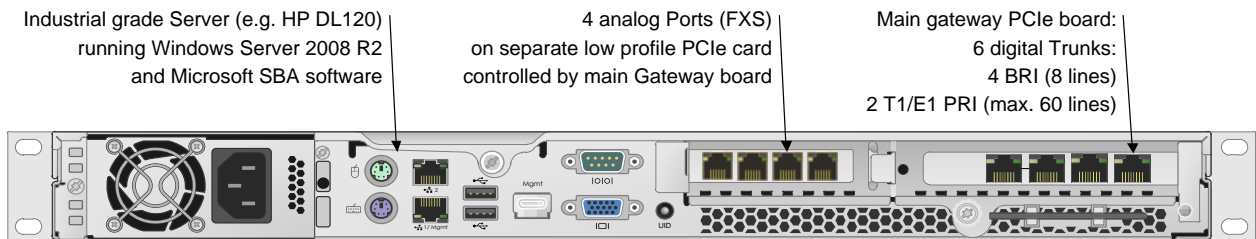
The same hardware can also be used as a Basic Hybrid Gateway for Microsoft Office Communications Server 2007 R2 which can be upgraded to a Survivable Branch Appliance later.



## 2 Hardware Overview and Installation

### 2.1 Rear View of Server machine

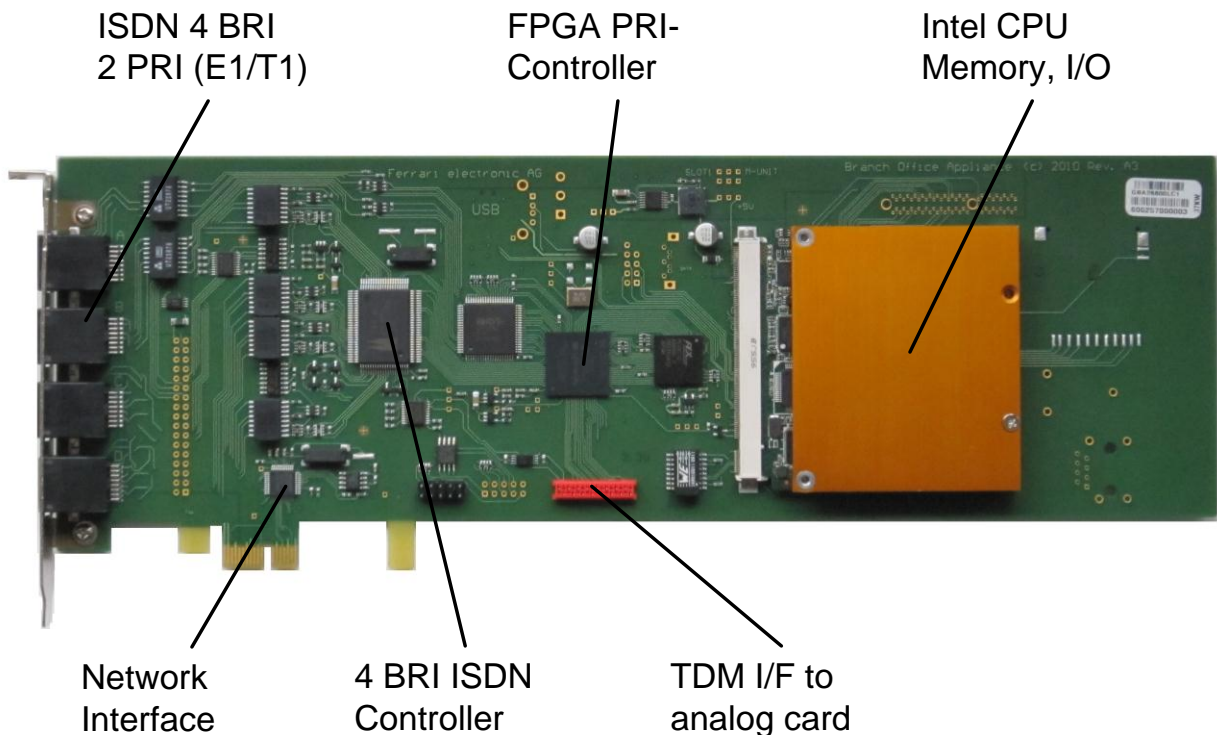
OfficeMaster SBA is shipped as an Appliance with preinstalled components:



- Industrial grade server machine (e.g. HP ProLiant)
- Main Gateway Board with 4BRI / 2PRI interfaces (can be licensed on demand)
- Separate 4FXS analog interface card (optional)

Separate Y-cables are available if all 4 BRI ports should be used – the first 2 BRI ports can be utilized using standard ISDN-cables.

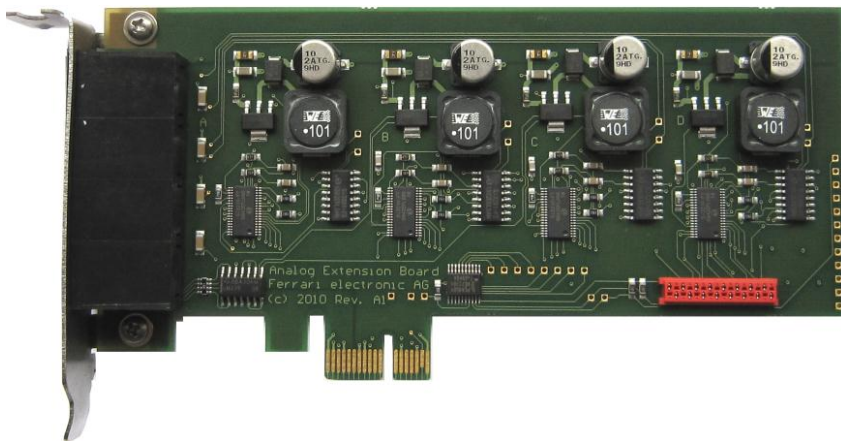
### 2.2 Anatomy of the Main Gateway Board



The Primary Rate Interface (E1/T1) is implemented in an FPGA (Field Programmable Gate Array) which contains additional support algorithms. It can even be upgraded in the field to implement more features as needed!

### 2.3 4-Port Analog Card (FXS)

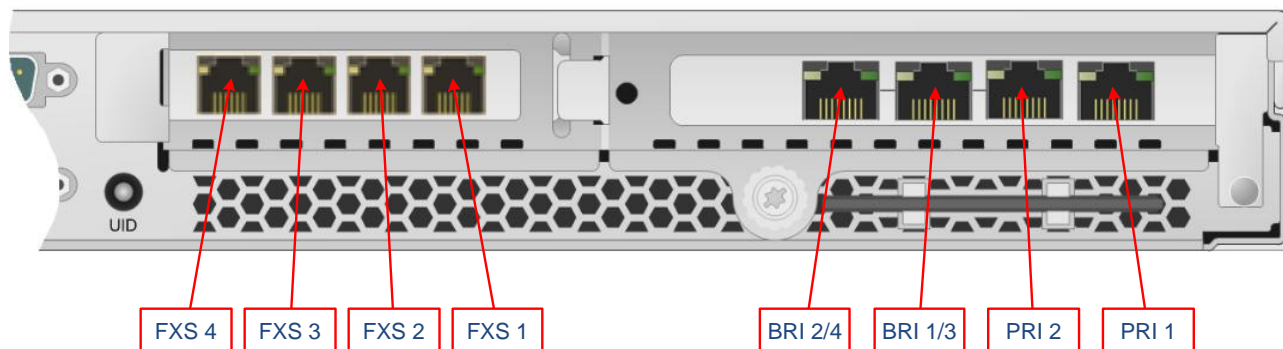
Four analog ports are contained on a separate low-profile PCI-Express Card connected to the main gateway board using a flat ribbon cable.



This cable transports audio signals through a TDM bus as well as separate control information. High quality faxing is possible since no VoIP technology is involved between PSTN and FXS ports.

### 2.4 ISDN and analog Interfaces

Positions of analog and digital interface connectors are shown in this picture (rear view):



For BRI ports a separate Y-cable must be used if more than two BRI lines are needed.

**Important note:** Never use PRI 2 without PRI 1 – if only one PRI interface is connected always use PRI 1, otherwise clock synchronization will not work!

The following table shows pin assignments of digital interface connectors:

Pin	PRI 1, PRI 2	BRI 1, BRI 2	BRI 3, BRI 4
1	Rx+		Tx+
2	Rx-		Tx-
3		Tx+	
4	Tx+	Rx+	
5	Tx-	Rx-	
6		Tx-	
7			Rx+
8			Rx-

**Important note:** If BRI interfaces are used in the US, a separate FCC approved NT1 Network Termination Unit must be installed to connect to OfficeMaster SBA S/T BRI ports.

For LAN-connection please plug in network cable at upper interface:



### 3 Configuration and Activation of OfficeMaster SBA (“Bootstrap”)

This chapter describes all necessary steps to put OfficeMaster SBA into operation. Some prerequisites must be prepared at the central office – the technician at the branch office only needs restricted credentials tailored to his needs.

#### 3.1 Prerequisites and preparation in Central Office

Before deploying OfficeMaster SBA, a few preparations must be done in the central office. Please refer to the instructions supplied by Microsoft together with Lync server software. These steps include setting up a computer account for SBA server and setting servicePrincipalName for this machine. In addition a user account for the SBA technician must be created and added to *RTCUniversalSBATechnicians* domain group.

#### 3.2 Step by step instructions for setting up OfficeMaster SBA

Connect to the Web based Administration by entering the Name of the Appliance (see included label) from a PC in the same network:



Enter “**Administrator**” at User Name and “**OfficeMaster!**” as Password (this will be changed in a later step). If you don’t run a DHCP Server you should prepare a PC with Network Address 192.168.101.100, Network Mask 255.255.255.0 and connect to 192.168.101.101.

The first screen of the Web Interface will guide you through network configuration. You can accept the predefined DHCP setting by clicking on “Done” or disable DHCP to enter static IP network configuration data:

Available NIC: Intel(R) PRO/1000 MT Network Connection

DNS-Name: SBXX

DHCP: Enable DHCP

IP-Address / Subnetmask: 192.168.1.43 / 255.255.255.0

Gateway: 192.168.1.1

DNS-Server: 192.168.1.1

DNS-Domain: jaenicke

MAC Address: 00:0C:29:FC:27:3E

Apply Changes

Done

Click “Apply Changes”, close and restart your browser and relogin using the newly assigned IP Address, then press "Done". This will bring you to the Password-screen:

Enter current credentials for local Administrator (User Administrator, Password OfficeMaster!) and new password twice. Confirm by clicking on “Change Password”.

Administrator Login Name: Administrator

Old Password:

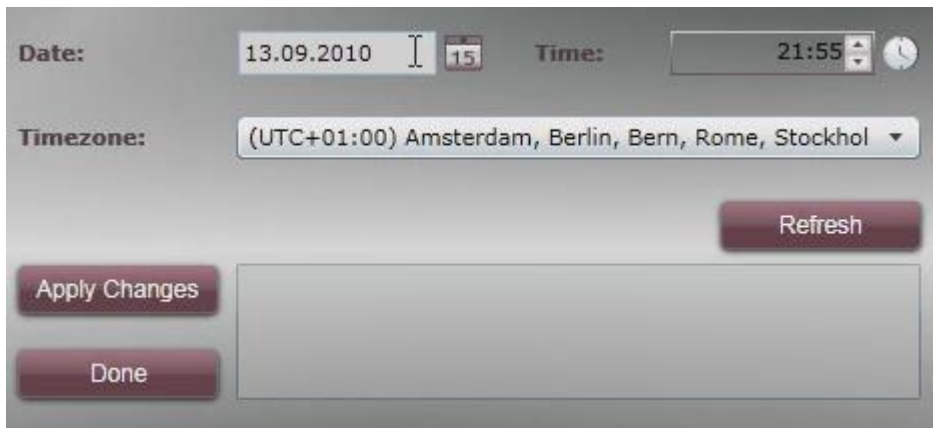
New Password:

Retype Password:

Change Password

Done

Click “Done” to advance to Date/Time settings.



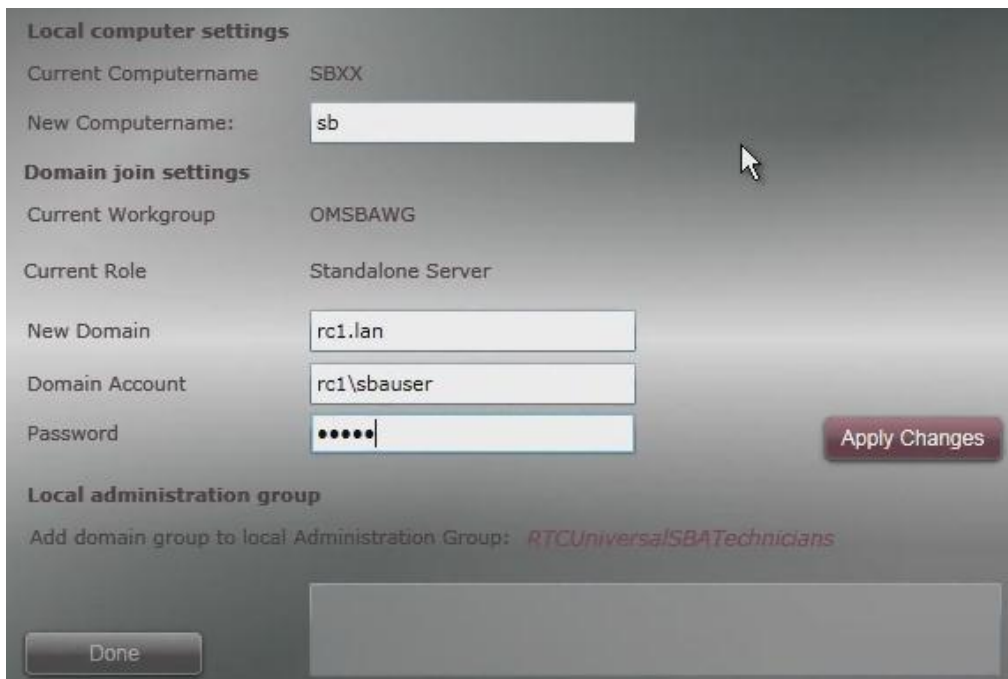
**Date:** 13.09.2010  15 **Time:** 21:55

**Timezone:** (UTC+01:00) Amsterdam, Berlin, Bern, Rome, Stockhol

You can adjust Date, Time and Time zone according to your local needs.

After submitting settings via “Apply Changes” click “Done” to continue.

Next step is changing the computer name and joining the domain. Enter all required information and press “Apply Changes”. After a few seconds the “Reboot” button will be enabled. Press “Reboot” to restart the machine and log in again using local Administrator account.



**Local computer settings**

Current Computername: SBXX

New Computername:

**Domain join settings**

Current Workgroup: OMSBAWG

Current Role: Standalone Server

New Domain:

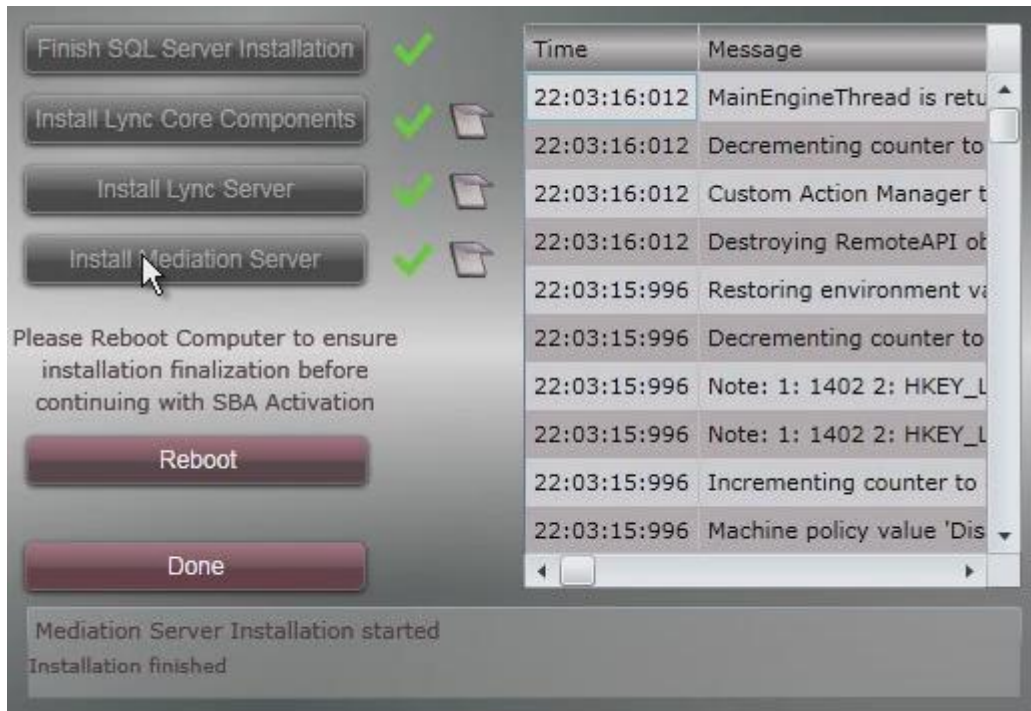
Domain Account:

Password:

**Local administration group**

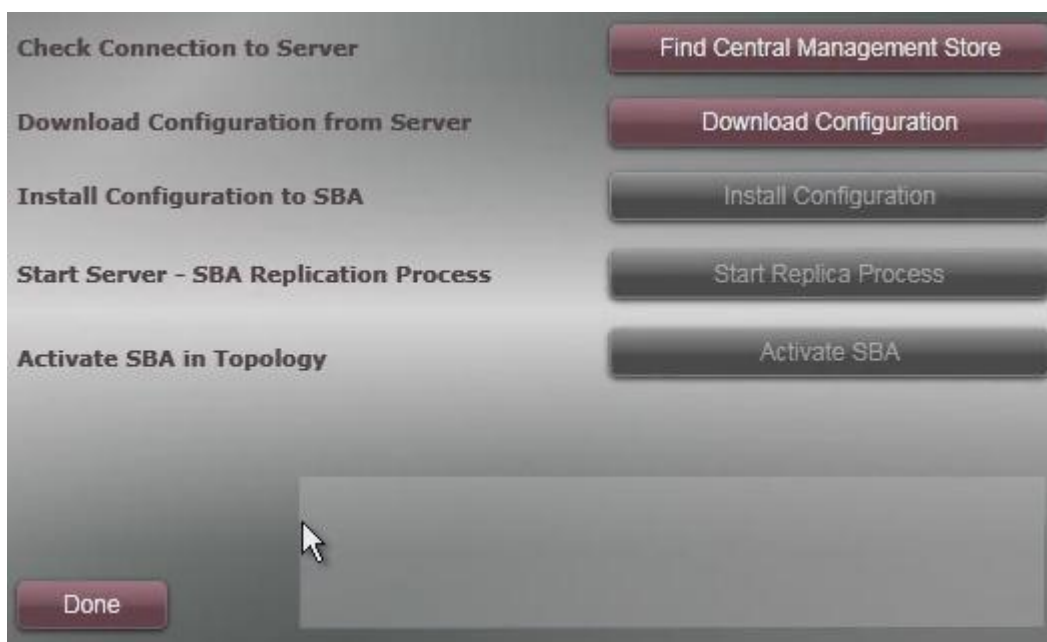
Add domain group to local Administration Group: *RTCUniversalSBATechnicians*

After that the predefined domain group “RTCUniversalSBATechnicians” is automatically added to local Administrators. Clicking “Done” finishes Bootstrap steps and starts “Install” section.



Installation log files can be downloaded after each install step is completed – this is helpful if any error has occurred. When all installation steps are finished, click “Reboot” to complete this part. Then login using the domain account prepared for SBA deployment and click “Done”.

Next step is Activation of Microsoft SBA components.



“Find Central Management Store” is used to check if general connectivity to database is granted.

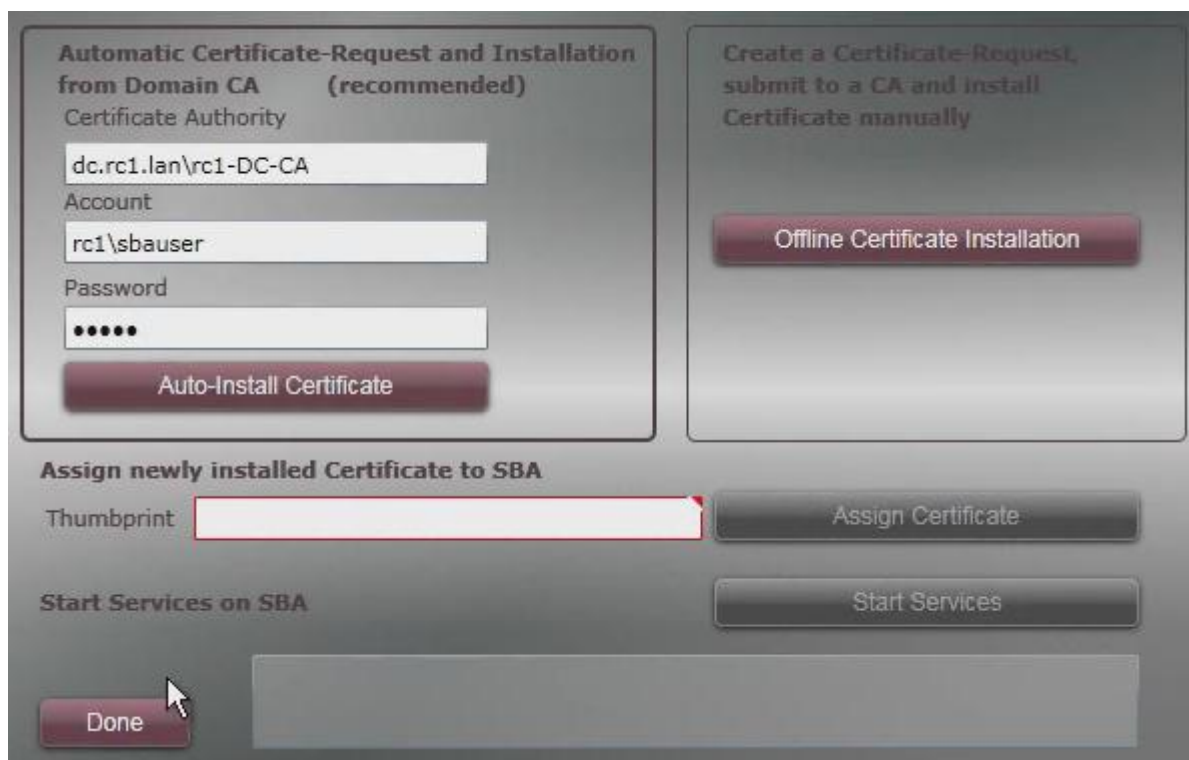
Click “Download Configuration” to retrieve configuration information from central management store.

“Install Configuration” puts this information into the local management store.

Then press “Start Replica Process” to enable continuous replication of changes.

Now you can activate the system by pressing “Activate SBA”. After clicking “Done” the certificate screen is shown.

If a Certificate Authority is found in Active Directory it may be used for requesting and installing the required certificate automatically. As an alternative a certificate sign request can be generated for offline certificate handling.



After successful request and installation of certificate the new certificate thumbprint is displayed. Press “Assign certificate” to assign this certificate to Lync services.

All local services should now be started by clicking “Start Services”.

Click “Done” to finish activation steps.

### 3.3 Media Gateway Card configuration

Basic configuration of the integrated Gateway Card can be done directly by using the Web UI, especially number and type of ISDN interfaces and network configuration (the Gateway Card is a network device of its own so it needs separate IP settings).

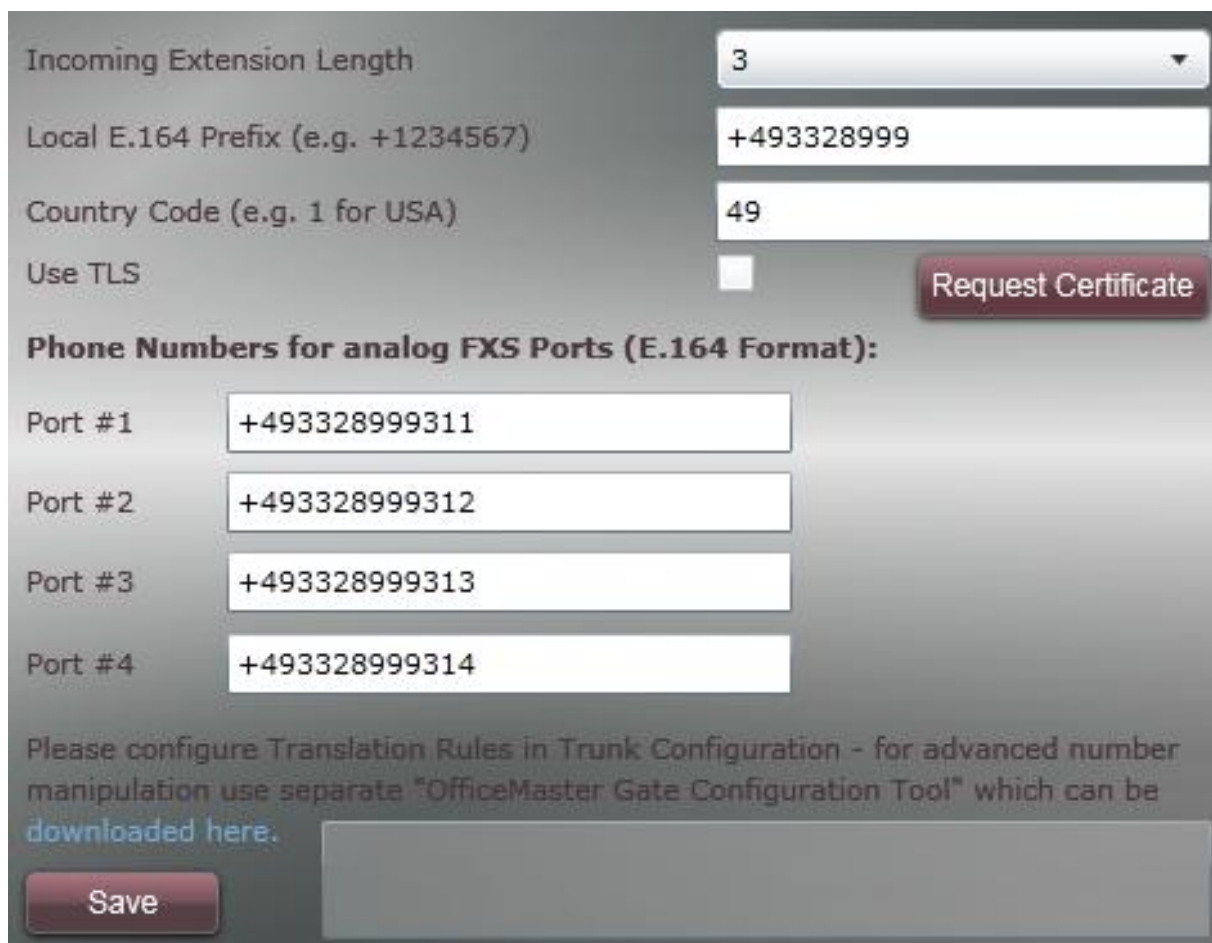
After all settings are done they should be saved by clicking "Save". Afterwards please click "Restart Gateway" to activate all changes. The gateway will be available again after approximately one minute.

The screenshot shows a configuration page for a Media Gateway Card. It includes the following fields and controls:

- Serial Number:** 7233, with a **Change** button.
- ISDN PRI Interface Type:** A dropdown menu set to **E1**.
- Number of PRI interfaces used:** Radio buttons for 0, 1, and 2, with 1 selected.
- Number of BRI interfaces used:** Radio buttons for 0, 1, 2, 3, and 4, with 1 selected.
- Use the following IP address:** A section header for network configuration.
- DHCP Mode:** A dropdown menu set to **Static IP address**.
- IP address:** Text input field containing **192.168.1.55**.
- Subnet mask:** Text input field containing **255.255.255.0**.
- Default gateway:** Text input field containing **192.168.1.1**.
- Use the following DNS server addresses:** A section header for DNS configuration.
- Preferred DNS server:** Text input field containing **192.168.1.41**.
- Alternative DNS server:** Text input field containing **192.168.1.1**.
- At the bottom, there are two buttons: **Save** and **Restart Gateway**.

A basic dial plan can be defined using the next dialog screen. Number of incoming extension digits is configured here as well as E.164 main part (which will be used to create full E.164-Number by appending extension digits). If only BRI interfaces are used together with MSN (multiple subscriber numbers) extension length should be set to 0.

Country must be defined as well and certificate should be requested and installed to be able to use TLS (and SRTP) for VoIP communications.



The screenshot shows a configuration window with the following fields and controls:

- Incoming Extension Length:** A dropdown menu set to '3'.
- Local E.164 Prefix (e.g. +1234567):** A text input field containing '+493328999'.
- Country Code (e.g. 1 for USA):** A text input field containing '49'.
- Use TLS:** An unchecked checkbox.
- Request Certificate:** A red button.
- Phone Numbers for analog FXS Ports (E.164 Format):** A section header followed by four text input fields:
  - Port #1: +493328999311
  - Port #2: +493328999312
  - Port #3: +493328999313
  - Port #4: +493328999314
- Save:** A red button at the bottom left.
- Footer text:** "Please configure Translation Rules in Trunk Configuration - for advanced number manipulation use separate "OfficeMaster Gate Configuration Tool" which can be [downloaded here.](#)"

Based on this information some inbound and outbound rules are created inside the gateway. For advanced configurations a separate tool needs to be installed and used on a Windows workstation.

More information on configuring rules using this tool can be found in "OfficeMaster Hardware Manual" available for download from <http://www.officemaster.de/en>.

## 4 SBA Diagnostics and Service management

### 4.1 PSTN Test

PSTN connection can be tested via this dialog. Outbound calls can be initiated through Lync Server functions – this is done by using the upper part of the form. Before this can be used some prerequisites (especially defining test users) must be configured in the datacenter.

The lower part provides the possibility to test outbound and inbound calls by controlling the gateway directly, independent of Lync Server components:

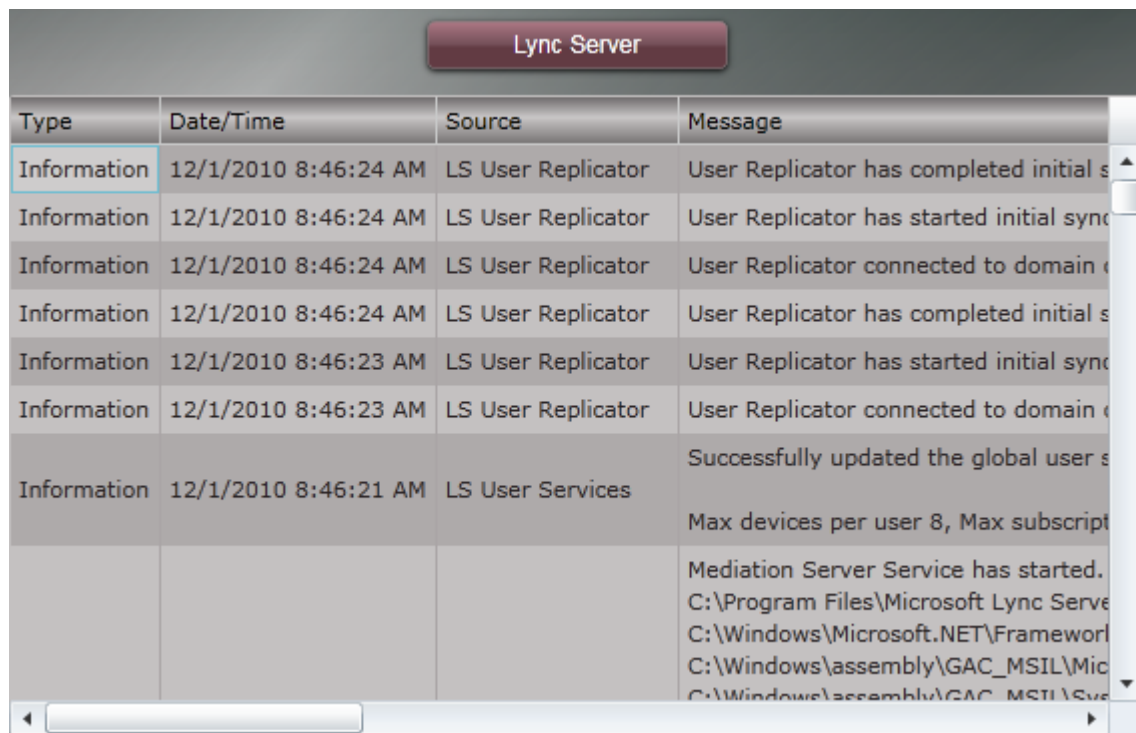
**Test outbound call via Lync Server**  
Target phone number (E.164 format, e.g. +123456789):   
 Result:

**Test PSTN gateway**  
 SBA-integrated gateway  external gateway (IP-Address)   
**Test outbound call**  
Target phone number (e.g. 123456789):   
Caller phone number (optional):   
 Result:

**Test inbound call**  
 Result:

### 4.2 Display Event log and Syslog file

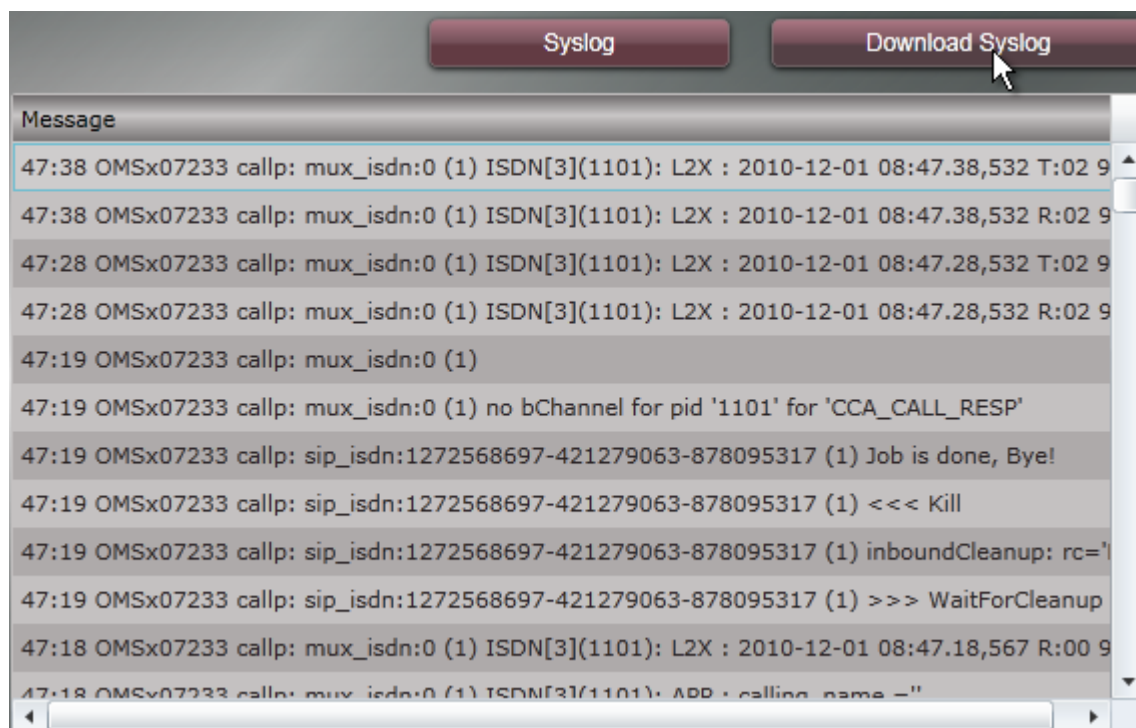
After starting OfficeMaster SBA Administration via browser and logging in with adequate credentials (e.g. SBA technician account created for bootstrapping) pressing “Diagnostics” button on the left side shows information from the Windows event log and gateway syslog output in separate screens (examples):



The screenshot shows a window titled "Lync Server" with a table of log messages. The table has four columns: Type, Date/Time, Source, and Message. The messages are informational and describe the startup and initial synchronization of the User Replicator service.

Type	Date/Time	Source	Message
Information	12/1/2010 8:46:24 AM	LS User Replicator	User Replicator has completed initial s
Information	12/1/2010 8:46:24 AM	LS User Replicator	User Replicator has started initial sync
Information	12/1/2010 8:46:24 AM	LS User Replicator	User Replicator connected to domain c
Information	12/1/2010 8:46:24 AM	LS User Replicator	User Replicator has completed initial s
Information	12/1/2010 8:46:23 AM	LS User Replicator	User Replicator has started initial sync
Information	12/1/2010 8:46:23 AM	LS User Replicator	User Replicator connected to domain c
Information	12/1/2010 8:46:21 AM	LS User Services	Successfully updated the global user s
			Max devices per user 8, Max subscript
			Mediation Server Service has started.
			C:\Program Files\Microsoft Lync Serve
			C:\Windows\Microsoft.NET\Framework
			C:\Windows\assembly\GAC_MSIL\Mic
			C:\Windows\assembly\GAC_MSIL\Svc

After Clicking "Syslog" the content of logging information sent from the gateway is displayed.



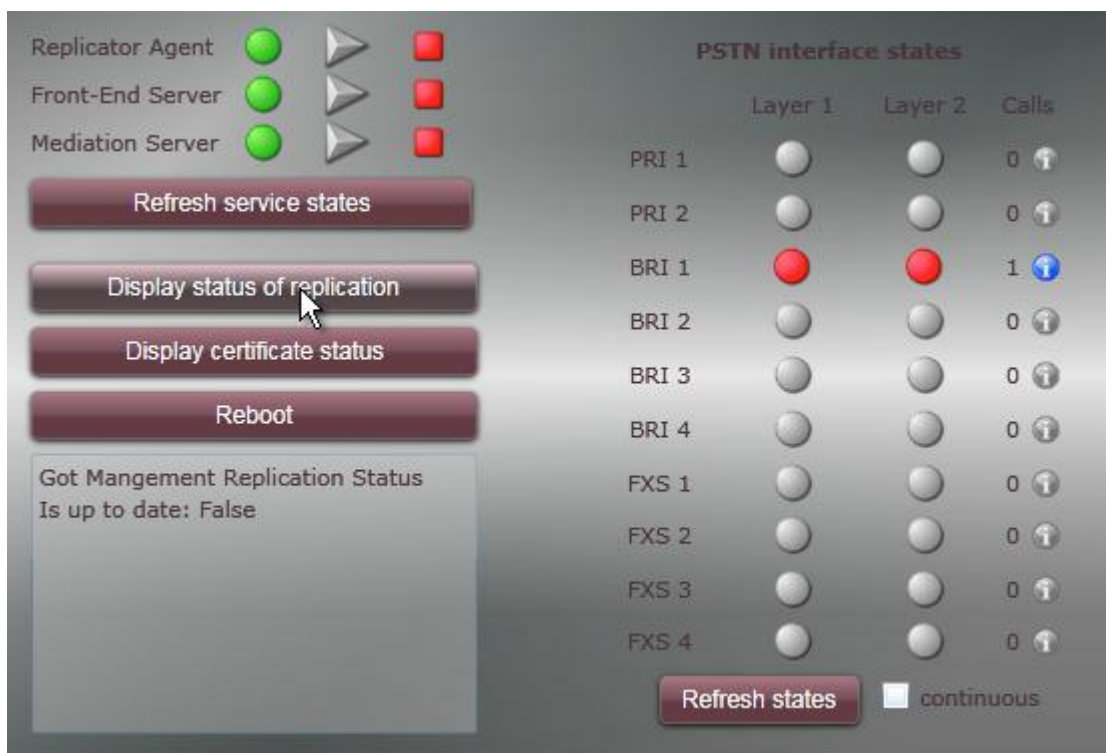
The screenshot shows a window titled "Syslog" with a "Download Syslog" button. Below the button is a list of log messages. The messages are informational and describe call processing events, including call setup, completion, and cleanup.

Message
47:38 OMSx07233 callp: mux_isdn:0 (1) ISDN[3](1101): L2X : 2010-12-01 08:47.38,532 T:02 9
47:38 OMSx07233 callp: mux_isdn:0 (1) ISDN[3](1101): L2X : 2010-12-01 08:47.38,532 R:02 9
47:28 OMSx07233 callp: mux_isdn:0 (1) ISDN[3](1101): L2X : 2010-12-01 08:47.28,532 T:02 9
47:28 OMSx07233 callp: mux_isdn:0 (1) ISDN[3](1101): L2X : 2010-12-01 08:47.28,532 R:02 9
47:19 OMSx07233 callp: mux_isdn:0 (1)
47:19 OMSx07233 callp: mux_isdn:0 (1) no bChannel for pid '1101' for 'CCA_CALL_RESP'
47:19 OMSx07233 callp: sip_isdn:1272568697-421279063-878095317 (1) Job is done, Bye!
47:19 OMSx07233 callp: sip_isdn:1272568697-421279063-878095317 (1) <<< Kill
47:19 OMSx07233 callp: sip_isdn:1272568697-421279063-878095317 (1) inboundCleanup: rc='
47:19 OMSx07233 callp: sip_isdn:1272568697-421279063-878095317 (1) >>> WaitForCleanup
47:18 OMSx07233 callp: mux_isdn:0 (1) ISDN[3](1101): L2X : 2010-12-01 08:47.18,567 R:00 9
47:18 OMSx07233 callp: mux_isdn:0 (1) ISDN[3](1101): APP : calling_name ="

Syslog file can be downloaded and viewed offline for troubleshooting.

### 4.3 System Status

Clicking “Status” button shows the administration page where Lync related services can be started or stopped. Also service status can be queried – see following output:



PSTN interface states are shown as colored bubbles:

- Grey            not used
- Yellow        idle
- Green         Layer (1 or 2) active/enabled
- Red            Layer (1 or 2) inactive/disabled

## 5 Connecting OfficeMaster SBA to analog (FXO) lines

Connection to analog subscriber lines is supported through separate FXO-SIP-ATA. The following documentation describes configuration of Grandstream GXW 4104 4-port device. Similar devices can be used as well.

Prerequisite in Trunk Configuration: Encryption Support Level should be set to “Optional”.

### 5.1 Important settings on Grandstream GXW4104

#### Basic Settings

static IP-Adress

#### Advanced Settings

No special settings required

#### FXO Lines

Everything set for default

#### Channels

Channel 1 set any User ID (I used 401);

DTMF Methods: ch1-4:2;

Everything else default

#### Dial plan

Default ({x+})

#### Profile 1

IP address of OfficeMaster Gateway as SIP Server/Outbound Proxy:

Activate Profile:	<input checked="" type="radio"/> Yes	<input type="radio"/> No	
Profile Name:	<input type="text" value="csr.lan"/>		(Optional, name of your profile)
SIP Server:	<input type="text" value="10.6.20.15:5060"/>		(Server domain name or IP address)
Outbound Proxy:	<input type="text" value="10.6.20.15:5060"/>		(Domain name or IP address if in use)
Use DNS SRV:	<input checked="" type="radio"/> No	<input type="radio"/> Yes	
User ID is phone number:	<input type="radio"/> No	<input checked="" type="radio"/> Yes	
SIP Registration:	<input checked="" type="radio"/> Yes	<input type="radio"/> No	

SIP Registration also can be switched to “No” since we use special rules inside the gateway so that the ATA device is seen as a SIP trunk.

TCP, no STUN:

SIP Transport:	<input type="radio"/> UDP	<input checked="" type="radio"/> TCP	
NAT Traversal (STUN):	<input checked="" type="radio"/> No	<input type="radio"/> No, but send keep-alive	<input type="radio"/> Yes

G.711 Codecs:

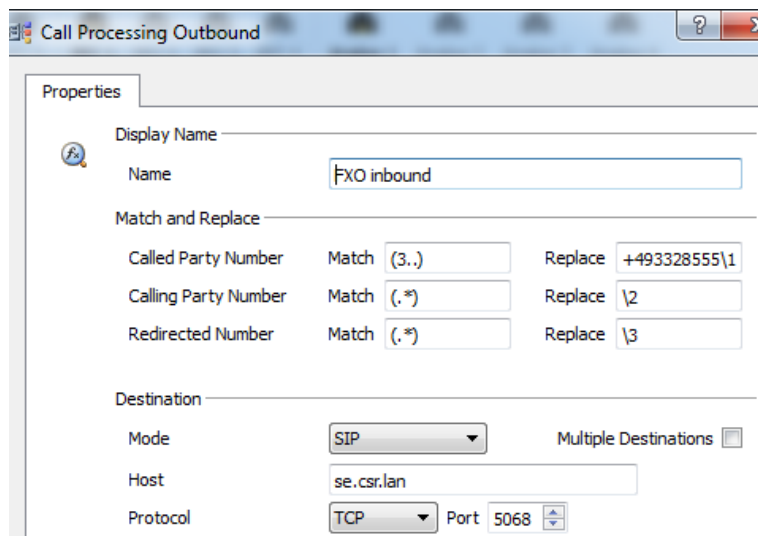
<i>Preferred Vocoder: (in listed order)</i>	choice 1:	PCMU	choice 5:	PCMU
	choice 2:	PCMA	choice 6:	PCMU
	choice 3:	PCMU	choice 7:	PCMU
	choice 4:	PCMU	choice 8:	PCMU

## 5.2 Settings in Gateway configuration

Create an outbound rule in Gateway configuration tool similar to this one:

In this example all calls going to +493328455xxx... are transferred to FXO ATA. Caller gets secondary dialtone and dials target analog extension.

Add another rule like this one:



Call Processing Outbound

Properties

Display Name

Name: FXO inbound

Match and Replace

Called Party Number	Match: (3.)	Replace: +493328555\1
Calling Party Number	Match: (.*	Replace: \2
Redirected Number	Match: (.*	Replace: \3

Destination

Mode: SIP Multiple Destinations:

Host: se.csr.lan

Protocol: TCP Port: 5068

This rule handles calls from analog device (e.g. Paging) to OC client. In this example analog device dials number like 3xx; these numbers are converted to full E.164 tel URI of OC client and the call is forwarded to mediation server, port 5068.

Example: analog device dials 345, calls gets forwarded to OC client with tel URI +493328555345