OPERA

Opera

VoIP Networking Configuration Guide

mds gateways

Specifications subject to change without notice.

DM-983 Draft

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1. Introduction

Up to one hundred systems may be combined in one Voice over IP network with one common numbering plan across all systems. Each system has a unique access code to allow local break-out from any site within the network.

1.1 Minimum requirements for operation

Each TDM system in the network must be equipped with an **Applications card**

A **Networking licence** is required for each site. The standard initial networking licence comes complete with two networking channels. Additional channels should be acquired for any site that may ever need to support more than two simultaneous calls with other systems in the network.

Broadband Internet access is required for each site. Each call needs 40 kbits/sec of bandwidth in each direction. This means, for example, for four channels (four simultaneous calls), 160 kbits/sec of bandwidth is required in each direction.

Router support for **dyndns** is required at any sites that do not have a fixed IP address.

1.2 Voice over IP networking facilities

The following features are supported across the VoIP network.

- Common numbering plan across all systems in the network. One to nine digit numbering plans are supported. Each extension has a unique internal number that can be used by all other users of the network, even to call from remote network systems.
- Remote Break-out means that extensions can make local calls through networked systems at the other end of the earth.
- Hold and Retrieve between remote sites
- Attended Transfer to a Remote Extension
- Unattended Transfer to a Remote Extension
- Least Cost Routing and Breakout
- Remote Hotline
- Calling Line Identity (CLID) and name transparency between remote locations
- Speed dials with remote breakout
- IP link status

1.3 Five steps to set up Voice over IP networking

Five steps are required to set up Voice over IP networking.

Step 1 – Set up a default gateway for each system, on the **IP addresses** page of each system; also a preferred DNS server, if you want to use URLs.

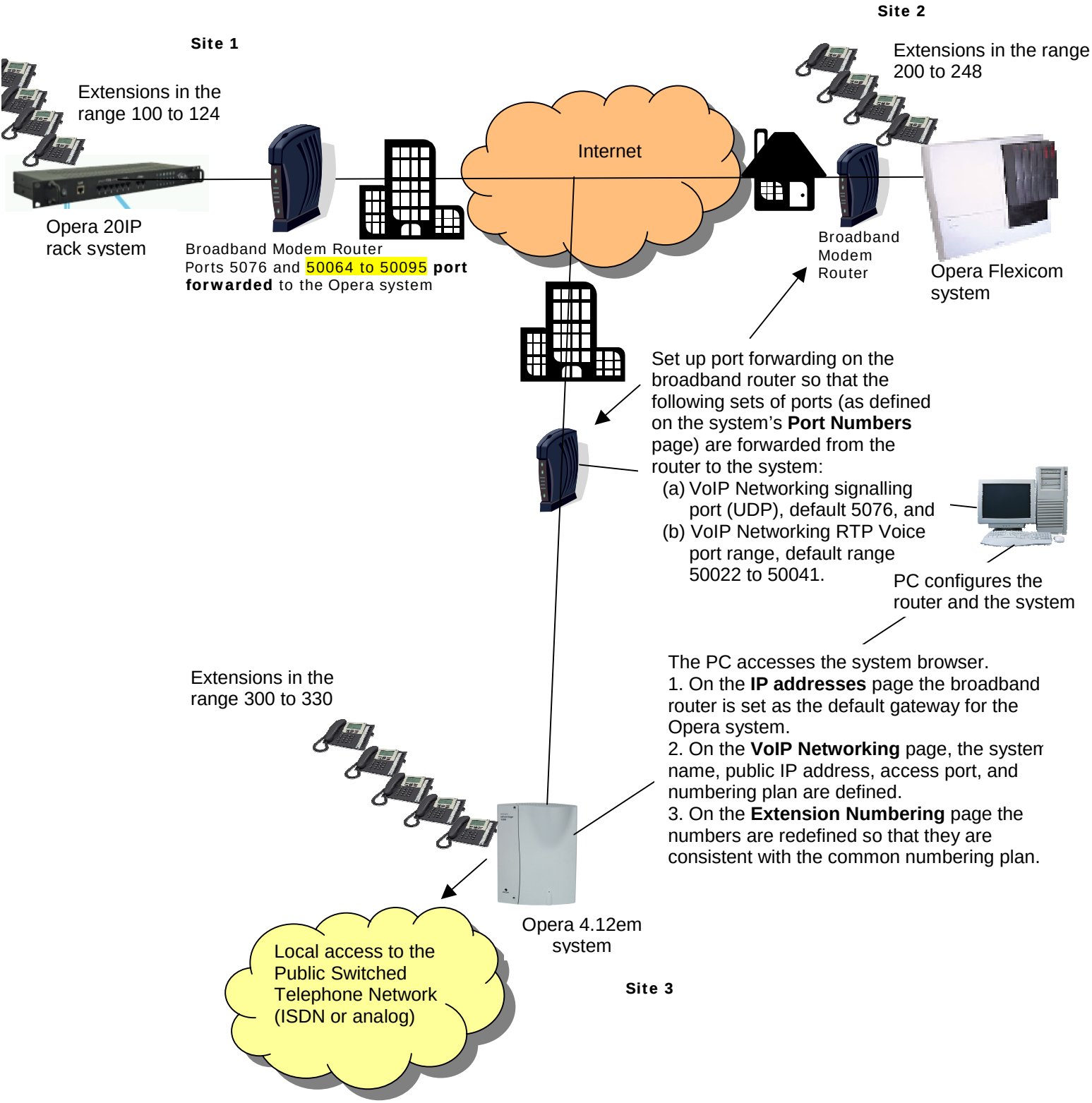
Step 2 – Set up port forwarding on the broadband routers associated with each of the systems so that the following sets of ports (as defined on the **Port Numbers** page) are forwarded from the routers to the respective systems:
(a) VoIP Networking Signalling port (UDP), default 5076, and
(b) VoIP Networking RTP Voice port range, default range 50022 to 50041 on the Opera Flexicom and Opera 4.12em; 50064 to 50095 on the Opera 20IP and Opera 4IP.
(Remote configuration option: for maintenance access, it may be convenient to forward the http port, 80, to the system).

Step 3 – Set up the networking parameters on the **VoIP Networking** page.

Step 4 – Adjust the **Extension Numbering** so that the extension numbers are consistent with the common VoIP numbering plan as defined by the range start and range end parameters. Similarly, if any of the following features are active they should be adjusted to avoid conflicts: **Group Numbers**, Conference Room Numbers in **Meet-Me Conference**, **Auto-Attendant**, **Line Access Codes** and **Least Cost Routing**.

Step 5 – Set up the other sites on the network, for example by accessing via the http browser port and using the Export/Import buttons on the VoIP Networking pages, followed by Step 4.

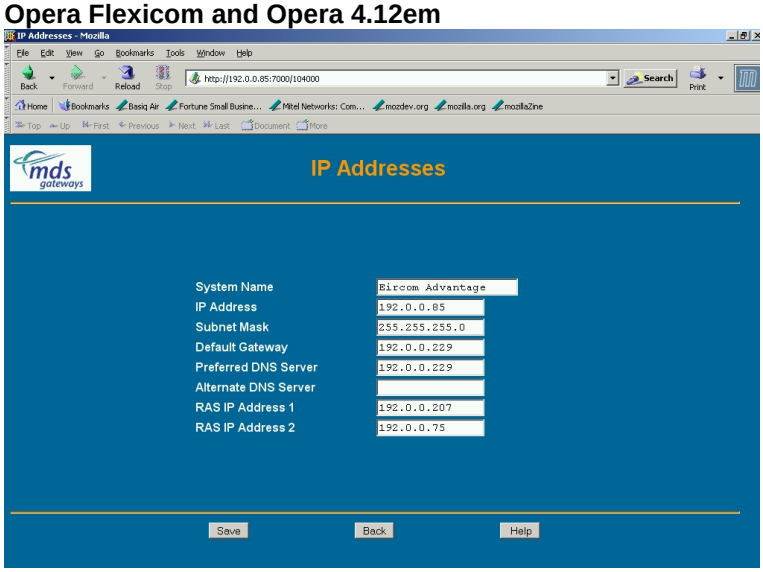
1.4 Block diagram of VoIP network configuration



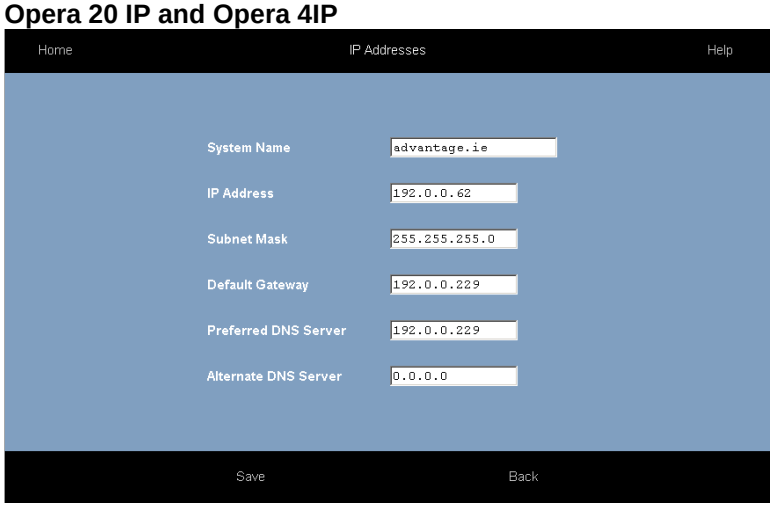
2. Define a default gateway for each system

Each system in the network must have access to the public Internet and be programmed with the address of the gateway to which it should send all VoIP packets that are Internet bound. This allows the Opera system to direct outgoing traffic to the correct Internet gateway. This **Default Gateway** address is entered in system browser based programming on the **IP Addresses** page.

Opera Flexicom and Opera 4.12em



Opera 20 IP and Opera 4IP

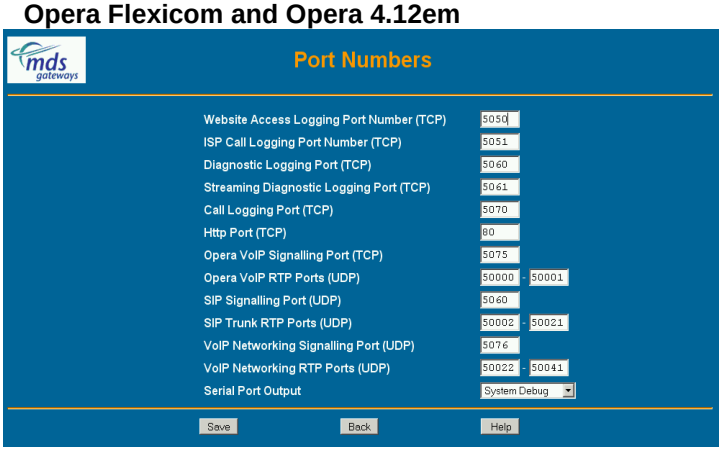


3. Configure router port forwarding

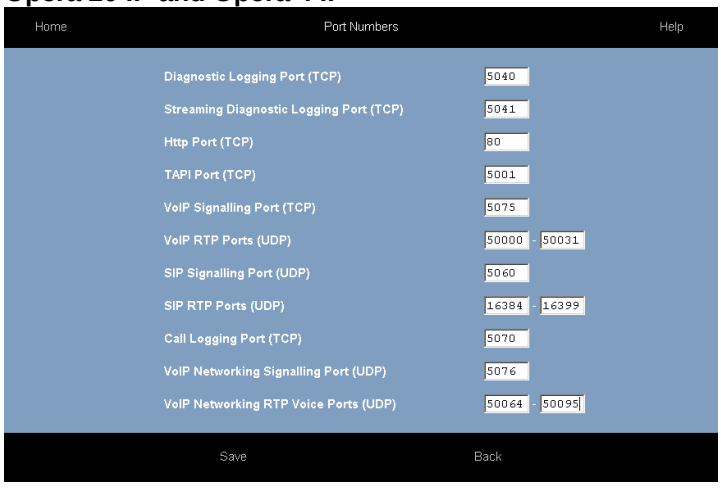
At each site, incoming VoIP calls to the Opera system are routed from the Internet, through a gateway modem/router on the LAN, to the Opera System. This modem/router must be configured to direct this traffic to the local IP address of the Opera system on the LAN.

Set up port forwarding on the broadband routers associated with each of the systems so that traffic on the following sets of ports (as defined on the **Port Numbers** page) are forwarded from the routers to the respective local IP addresses of the systems:
(a) **VoIP Networking Signalling port (UDP)**, default 5076, and
(b) **VoIP Networking RTP Voice ports (UDP)**, default range 50022 to 50041on the Opera Flexicom and Opera 4.12em; 50064 to 50095 on the Opera 20IP and the Opera 4IP.

Opera Flexicom and Opera 4.12em



Opera 20 IP and Opera 4 IP

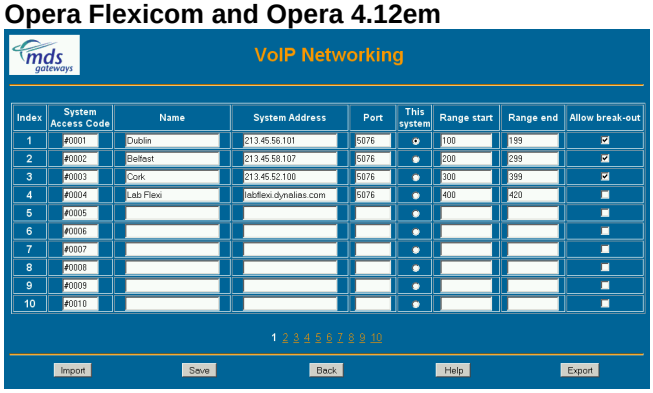


Please note that if there are other http servers on the LAN, e.g. web page hosting, it's best to redefine the http port and to forward that new port to the system.

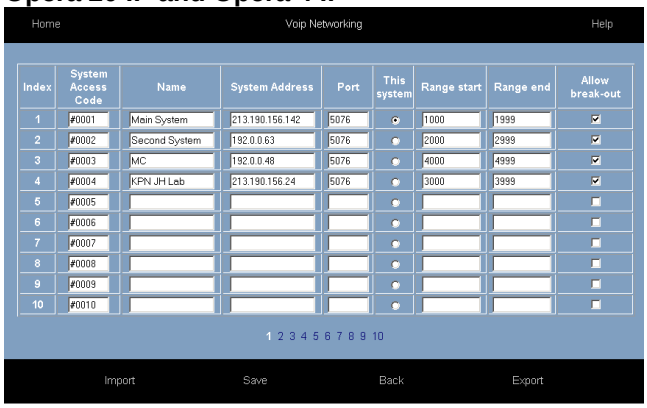
4. Define VoIP networking parameters

Go to the VoIP Networking page and define the parameters as follows.

Opera Flexicom and Opera 4.12em



Opera 20 IP and Opera 4 IP



System access code: the unique access code for a site within the network. If this code is used from any remote location within the network, internal dial tone on that site is provided. This code can also be used in Least Cost Routing or as a prefix for speed dials.

Name: a name can be provided to each site within the network, as an ease of reference.

System address: A public IP address or a URL is required to locate the system on the public Internet. If a URL is specified, please ensure that a DNS server is defined on the IP address page in section 2.

Port: VoIP Networking control signalling port number, to which all networking control signalling is sent, default 5076. Please ensure that port forwarding is set on the external router for this specific port.

This system: In a network environment, each system should know what part of the numbering plan and what unique access code are assigned to it.

Range start: This field shows the start of the numbering plan for each site. The appropriate prefix is added automatically when numbers from this range are dialled from other sites (i.e. "common numbering plan").

Range end: This field shows the end of the numbering plan for the site.

Allow break-out: Ticking this box allows remote extensions at the remote ticked system to make external calls via 'This system'. The level of access that remote extensions have on their own local

system applies to their outside calls via 'This system'. For example, if a user has "national plus" access on their local system, then they also have "national plus" access on 'This system', even though it may be on a different continent. If the box is unticked, remote users from that site have no access to external lines and break-out calls are not allowed.
By default the boxes are unticked and break-out calls are not allowed.

4.1 Export Import functions for copying to other sites

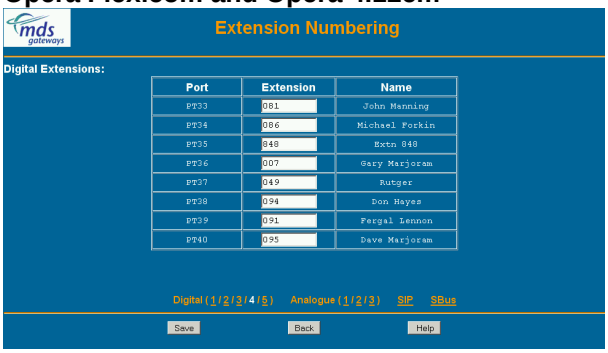
The Export Import buttons on the VoIP Networking page may be used to facilitate configuring other sites on the network:

Export: The network is most conveniently set up from one system's configuration, using the Export function. After completing the setup on one system, press the Export button to save the settings to a file, e.g. on your hard drive.

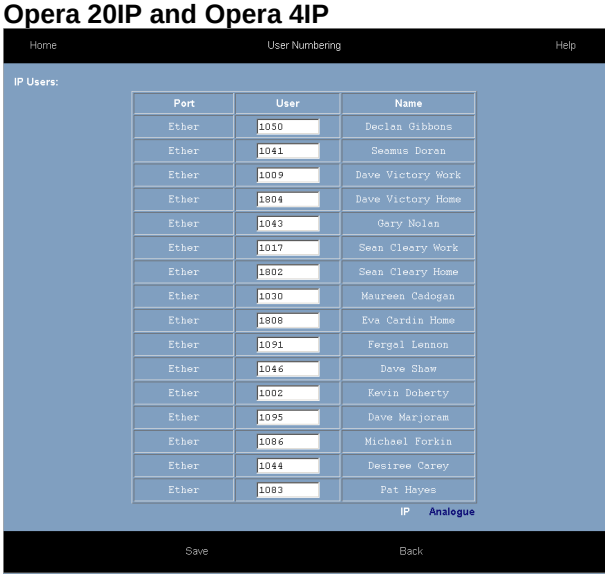
Import: The network configuration file that is obtained from the first site can be uploaded to all other systems within the network, provided those sites can be accessed, i.e. browser port (default port 80) on the remote site's router is forwarded to the associated system.
Access the remote system by its IP address (or URL, if set).
Press the Import button, to load the file that was saved above using the Export button.
After Importation is complete, press the "This system" button that corresponds to the remote system and press Save to complete the configuration for that system.

5. Program extension numbers in one common numbering plan

Opera Flexicom and Opera 4.12em



Opera 20IP and Opera 4IP



On the system **Extension Numbering** page, adjust each of the extension numbers as required so that the numbers are consistent with the common numbering plan as defined by the range start and range end in the **VoIP Networking Parameters** page.

This means that the extension numbered 216 will have the same internal number, 216, to all other users of the network, irrespective of their location.

If any of the following features are active on your system, it will be necessary to adjust the numbers on the following pages for consistency with the common numbering plan and to avoid any conflicts.
Group Numbers,
Conference Room Numbers in **Meet-Me Conference**,
Auto-Attendant,
Line Access Codes and
Least Cost Routing

6. Systems networked on the same LAN

If two or more systems on the same LAN are networked together, they share the same public IP address so it will be necessary to use a different VoIP signalling port number for each system in order to distinguish incoming traffic between the two systems. For example, if the first system uses the default VoIP signalling port number 5076, the second system could use the next available port number 5077 for VoIP signalling and so on.

It will also be necessary to use a different range for the VoIP Networking RTP voice ports. For example, if the first system uses the default port range 50064-50095, the second system could use the range 51064-51095 and so on.

7. Trouble shooting

Fault information on the third line of the display of networked system phones may be interpreted as follows.

"**Local channels busy**"
All Local VoIP Networking Channels are in use.

"**No license installed**"
The Local system does not have any VoIP Networking license installed.

"**Connection fault**"
The VoIP packet was sent from the local system but received no reply from the remote system.

Following are typical examples of the possible faults.

Your gateway settings may be programmed incorrectly, (check the Gateway settings on the **IP Addresses** page of the system browser).
Your local router may be powered down or not contactable (try to "ping" the router from your PC).
Your DSL connection may not be up and running (verify your Internet connection by connecting to a web page from your PC, e.g. www.google.com).
The Remote IP address may be set incorrectly (check that the System Address for all remote systems on the **VoIP Networking** page)
The Remote router may be powered down.
The port forwarding on the remote router may be incorrect.

"**Rejected**"
Your IP System Address may be incorrectly entered at the remote site.

"**Busy**"
The remote extension is busy on a call.

"**Remote channels busy**"
All VoIP Networking Channels at the remote end are in use.

"**No remote license**"
The Remote system does not have a VoIP Networking license installed.

In case of "**Invalid Number**" display when dialling the extensions on a remote networked system, ensure that the port forwarding on the broadband routers associated with each of the systems is set so that the following sets of ports (as defined on the **Port Numbers** page) are forwarded from the routers to the respective systems:

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(b) VoIP Networking RTP Voice port range, default range 50022 to 50041 for the Opera Flexicom and the Opera 4.12em; 50064-50095 on the Opera 20 IP and the Opera 4 IP.