

R&S® IP-GATE

IP gateway for ISDN encryption devices



R&S®IP-GATE

At a glance

The R&S®IP-GATE is an IP interface for the most recent models of the R&S®MKS9680 and ELCRODAT 6-2 encryption devices. Used with R&S®MKS9680 and ELCRODAT 6-2 encryption devices, the R&S®IP-GATE enables communications on land- and satellite-based IP networks to the highest security standards.

The R&S®IP-GATE is a gateway that enables ISDN terminal equipment to communicate over IP networks. The support of the ISDN data service allows the setup for secure end-to-end communications with ISDN encryption devices on ISDN and IP networks.

The R&S®IP-GATE is optimized to work with ELCRODAT 6-2 (version 7.70 or later) and R&S®MKS9680 encryption devices. The R&S®IP-GATE is available in a number of models designed specifically for the R&S®MKS9680 and ELCRODAT 6-2 S BRI encryption devices and the ELCRODAT 6-2 M PRI encryption device. The R&S®IP-GATE includes internal mechanisms for secure communications with R&S®MKS9680 and ELCRODAT 6-2 encryption devices over IP-based satellite channels even under difficult transmission conditions. Plus, it comes with mechanisms that support synchronous multichannel transmissions.

With the R&S®VoIP-SERVER software, the R&S®IP-GATE can operate as an ASTERISK server that can act as a gateway between ISDN and IP networks. R&S®VoIP-SERVER supports the IAX2 and the SIP protocol.

Key facts

- Gateway for R&S®MKS9680 and ELCRODAT 6-2 encryption devices on IP networks
- Gateway for encrypted end-to-end communications with the R&S®MKS9680 and ELCRODAT 6-2 over IP-based satellite links
- Local and remote administration



R&S®IP-GATE

Benefits and key features

Gateway for R&S®MKS9680 and ELCRODAT6-2 devices on IP networks

- Support of ISDN data service
 - Support of redirect functionality
 - Support of server-to-server communications using SIP or IAX2
 - Support of outband signaling on the ELCRODAT6-2
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Direct connection between two R&S®IP-GATE devices

- Two R&S®IP-GATE devices in client-server mode
- ▷ [page 7](#)

Adaptive jitter buffer

- Jitter buffer for connections with high error rates and under difficult transmission conditions
 - Support of synchronous ISDN channel bonding for a higher data rate
- ▷ [page 8](#)

Local and remote administration

- Web-based administration
 - Parameter setting with configuration scripts
 - Software updates
- ▷ [page 10](#)

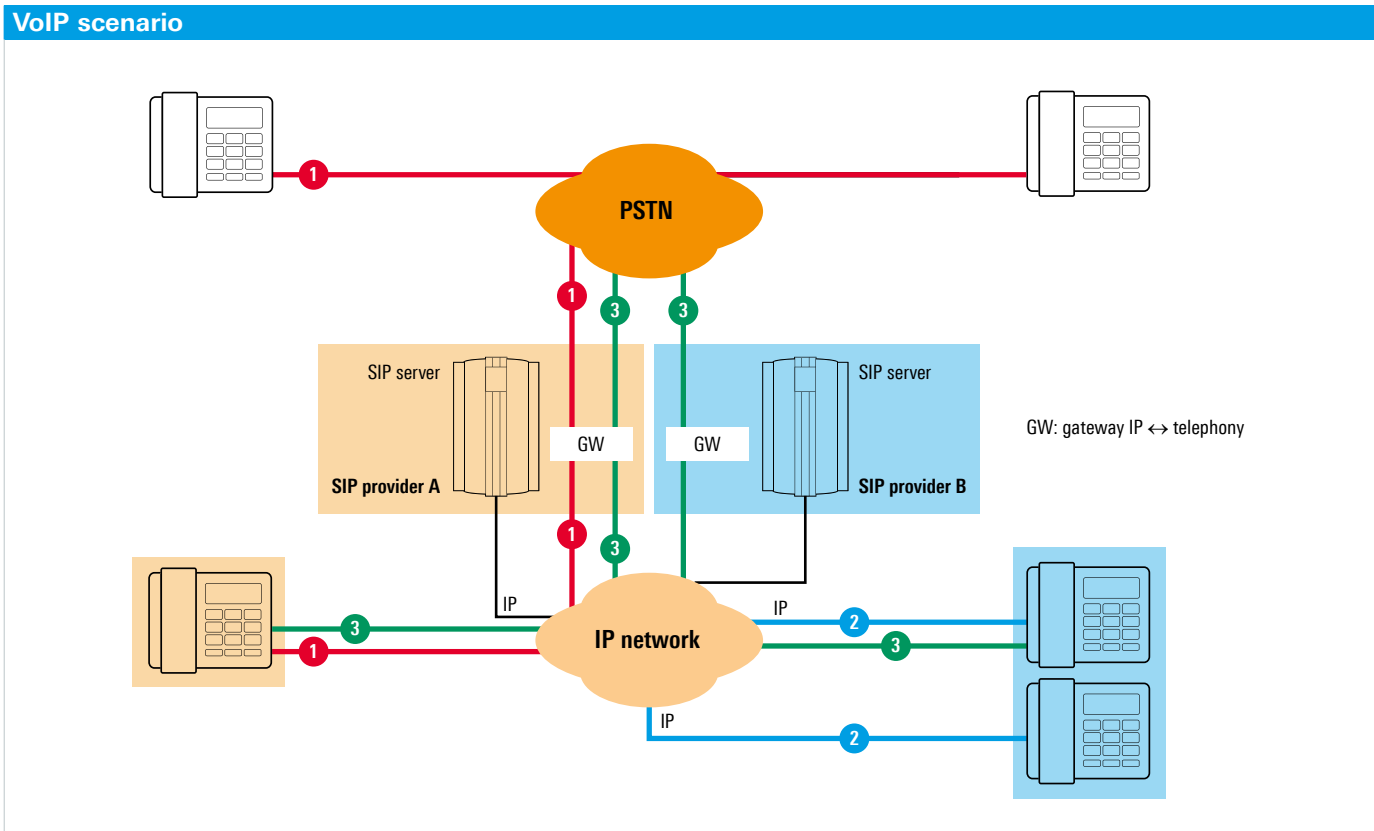
Available models, software

R&S®IP-GATE 2S0	Model with two ISDN BRI ports
R&S®IP-GATE 4S0	Model with four ISDN BRI ports
R&S®IP-GATE S2M	Model with one ISDN PRI port
R&S®VoIP-SERVER	ASTERISK server software supporting IAX2 and SIP

Gateway for R&S®MKS9680 and ELCRODAT 6-2 devices on IP networks

Support of ISDN data service

VoIP telephony is already common and will continue to become increasingly widespread. Unlike telephones on the conventional public switched telephone network (PSTN), VoIP telephones on IP networks are accessed using their IP address. VoIP phones need to be able to call not just other VoIP phones but also phones on the PSTN, and vice versa (see connection 1 in the graphic on this page). For this to function, a VoIP phone has to be assigned a phone number that can be called from the PSTN. This phone number and the IP address of the VoIP phone on its IP network must be associated with one another and mapped accordingly by a gateway. This task is commonly carried out by SIP servers. VoIP phones have to register with a provider's SIP server. The server assigns them a unique SIP ID along with a PSTN phone number. VoIP phones announce their IP address to the provider's SIP server when they are switched on and whenever their IP address changes. This enables the server to map the current IP address to the right SIP ID and phone number.

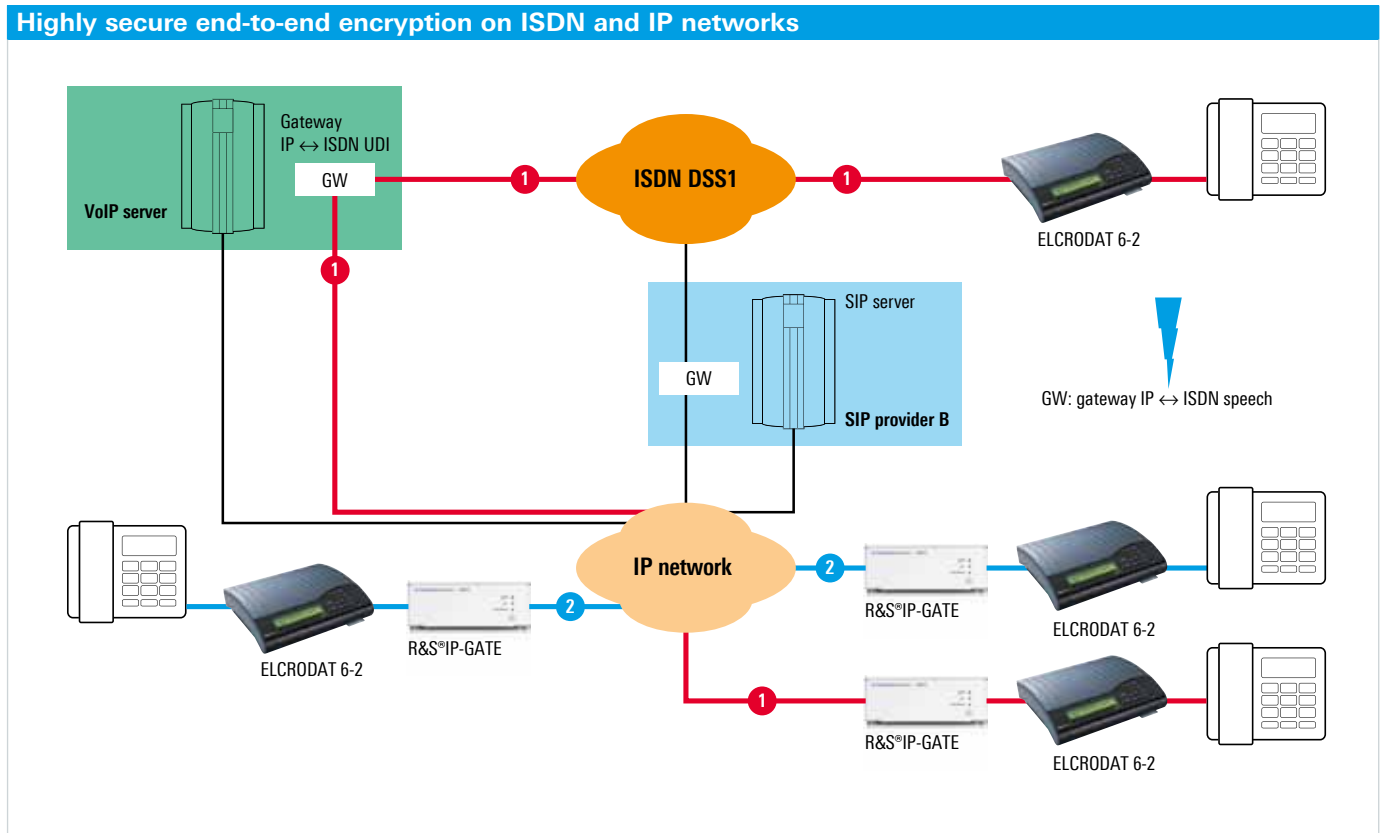


Calls between VoIP subscribers registered on different SIP servers are usually routed over the PSTN (see connection 3 in the graphic on page 4). This involves decoding and re-encoding the voice signal. Only rarely do VoIP calls run directly from server to server without being routed over the PSTN. In these instances, too, the voice signal is usually decoded and re-encoded by the SIP servers.

If VoIP subscribers are registered on the same provider's SIP server, calls are routed over the IP network without decoding and re-encoding the voice signal. The media path can be optimized through redirection (see connection 2 in the graphic on page 4).

SIP servers mostly support telephony over gateways to the PSTN but no other services. The R&S®IP-GATE is an IP terminal equipped additionally with ISDN ports for connecting R&S®MKS9680 and ELCRODAT 6-2 ISDN encryption devices. These encryption devices use ISDN's transparent data service for encrypted communications. This prevents re-encoding and, therefore, the falsification of encrypted information on the transmission link. SIP providers' gateways usually do not support the ISDN data service and reject data calls.

The R&S®VoIP-SERVER software is an ASTERISK server which manages connected IP devices in accordance with the IAX2 protocol. The server assigns PSTN phone numbers to these devices as necessary. R&S®VoIP-SERVER's gateway functionality supports the ISDN data service and does not re-encode the voice data. This means that R&S®MKS9680 and ELCRODAT 6-2 ISDN encryption devices connected to an R&S®IP-GATE on an IP network can successfully conduct encrypted communications with other encryption devices connected on ISDN (see connection 1 in the graphic on this page).



Support of redirect functionality

If one of two terminals communicating with one another is on an IP network and the other on the PSTN, they always communicate over a server.

If both the terminals are R&S®IP-GATE devices installed on the same IP network and registered with the same R&S®VoIP-SERVER, they can communicate with one another directly over the IP network without involving the VoIP server. To do so, they need to obtain the required connection information from the R&S®VoIP-SERVER (see connection 2 in the graphic on page 5). This is known as redirect functionality.

With redirect, the central VoIP server is only needed to set up the connection. There is no load on the VoIP server when the two R&S®IP-GATE devices are communicating.

Support of server-to-server communications using SIP or IAX2

Larger locations often have their own SIP servers to manage their on-site VoIP phones. Besides encrypted connections, the ELCRODAT 6-2 encryption device from Rohde&Schwarz also supports plain connections. This means that a user connected to an ELCRODAT 6-2 can communicate with another user on a VoIP phone over an unencrypted link. Because the two users are registered on different servers, the connection generally runs over the PSTN.

To enable an ISDN phone and a VoIP phone to communicate over the IP network when at the same location, R&S®VoIP-SERVER supports SIP in addition to IAX2. Over SIP (or IAX2), the R&S®VoIP-SERVER and the on-site SIP server can exchange the required connection information, as long as the SIP server provides this capability.

Support of outband signaling on the ELCRODAT 6-2

ELCRODAT 6-2 encryption devices support outband signaling on ISDN. Outband signaling employs the ISDN supplementary services sub addressing (SUB) and user-to-user signaling 1 (UUS1).

Most public SIP and ASTERISK servers do not support ISDN-standard supplementary services via the SIP or IAX2 protocol. To enable ELCRODAT 6-2 encryption devices with optional outband signaling to be used over IP networks, the R&S®IP-GATE and R&S®VoIP-SERVER support this type of signaling. This capability means that ELCRODAT 6-2 encryption devices can be cascaded on IP networks, for example.



ELCRODAT 6-2 encryption device.

Direct connection between two R&S®IP-GATE devices

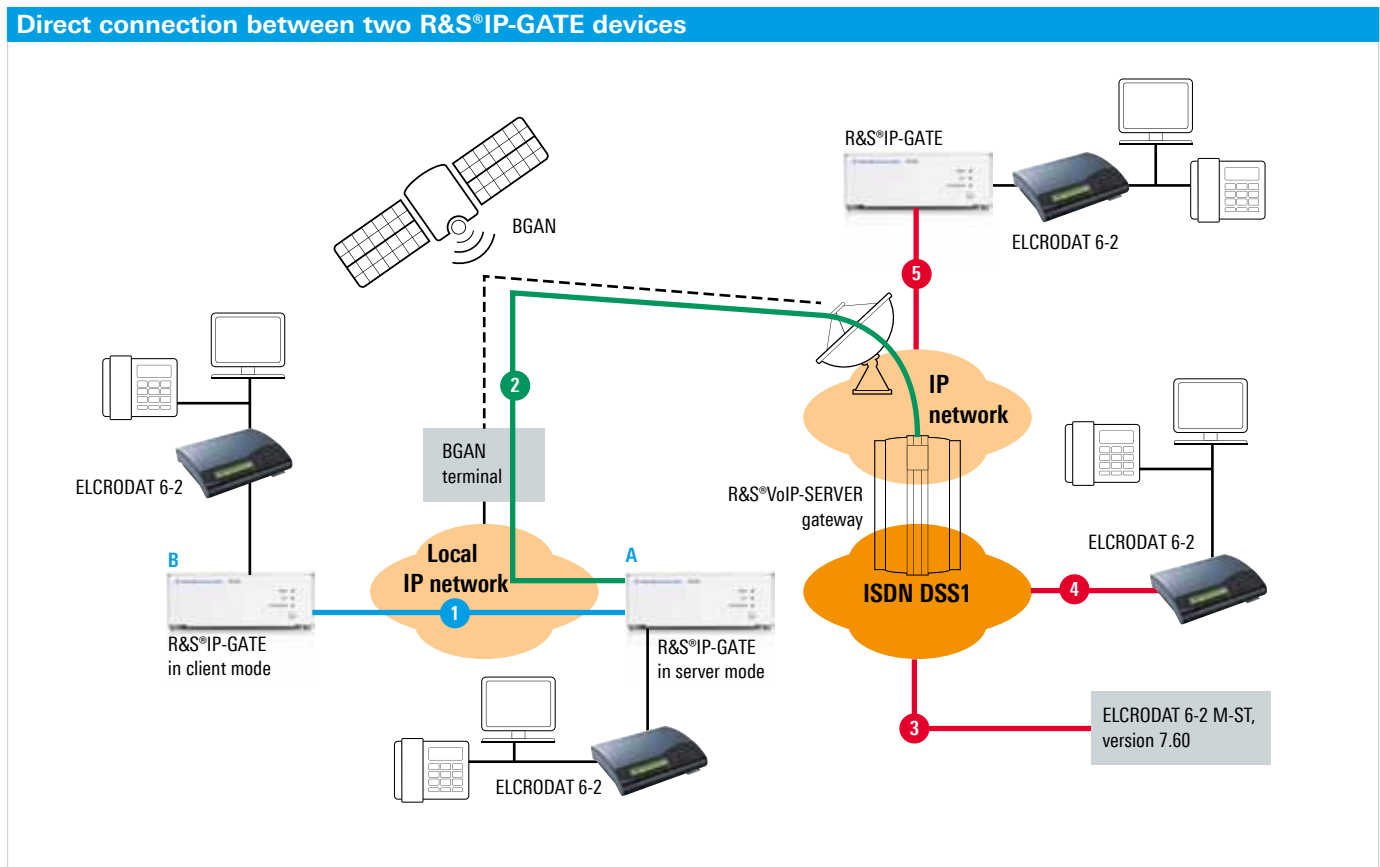
Two R&S®IP-GATE devices in client-server mode

If two R&S®IP-GATE devices are communicating regularly on a local IP network that has a satellite connection, they should do so directly without contacting a VoIP server over the satellite link.

On larger local IP networks, this can be accomplished using a separate, local VoIP server. If two R&S®IP-GATE devices primarily communicate with one another, then one of the two may be operated in server mode. This R&S®IP-GATE then essentially behaves like an R&S®VoIP-SERVER, with the exception that it will accept just one R&S®IP-GATE as a client.

In the graphic, R&S®IP-GATE (A) is operating in server mode and R&S®IP-GATE (B) in client mode. R&S®IP-GATE (A) must be assigned either a fixed IP address or a unique DNS name. This approach enables a bidirectional link between the two R&S®IP-GATE devices (A) and (B) (see connection 1 in the graphic), eliminating the need to involve costly satellite communications in running a local, direct link.

The R&S®IP-GATE (A) in server mode can be registered with an R&S®VoIP-SERVER on its home network. This means that both R&S®IP-GATE devices can communicate over an R&S®VoIP-SERVER via satellite (connection 2). For example, via the R&S®VoIP-SERVER on the home network, they can communicate with the ELCRODAT 6-2 M-ST (to obtain a certificate update, for example; connection 3) or with other devices on ISDN (connection 4) or on an IP network (connection 5).



Adaptive jitter buffer

Jitter buffer for connections with high error rates and under difficult transmission conditions

The R&S®IP-GATE is used as a gateway between ISDN encryption devices and a packet-switched IP network. On the receive side, the ISDN encryption devices need data to arrive in a continuous stream. On IP networks, however, data packets often have different latencies. With satellite communications in particular, error rates can be high, resulting in lost packets. Furthermore, the sequence of packets received is often different from the order in which they were sent.

The R&S®IP-GATE has an internal adaptive jitter buffer. The purpose of this buffer is to compensate for latency fluctuations, replace lost packets with dummy packets, and restore the original packet sequence. This enables the ISDN encryption devices to receive data in a continuous stream. The jitter buffer is adaptive, which means it can adjust to the transmission quality of each connection.

Particularly with satellite communications and with data rerouted on IP networks, latency can fluctuate heavily, but the R&S®IP-GATE can also adjust to accommodate this.



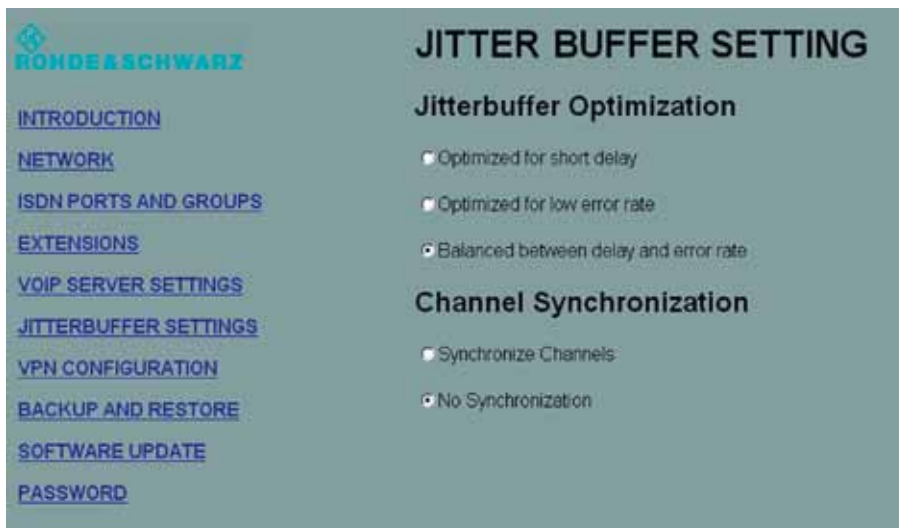
R&S®MKS9680 modular encryption device.

Support of synchronous ISDN channel bonding for a higher data rate

For video and other types of communications requiring higher data rates on ISDN, terminal devices can connect with one another over multiple, parallel ISDN channels. The terminal devices assume that latency is more or less the same on the individual channels across the network. However, this is not always the case, particularly with IP-based satellite communications. Here, the difference in latency is often so large that the terminals are unable to aggregate the data on the individual channels to form a continuous data stream.

The adaptive jitter buffer in the R&S®IP-GATE treats individual channels connecting two terminals as one and balances the latency differences between the channels. The overall latency may be greater than for the fastest (virtual) channel as a result, but the difference between the individual ISDN channels is corrected. The R&S®IP-GATE thus provides a multichannel connection with a continuous data stream, even with major latency differences and fluctuations in latency.

Jitter buffer settings.



The screenshot displays the 'JITTER BUFFER SETTING' configuration page in the R&S IP-GATE web interface. On the left, a navigation menu lists various settings: INTRODUCTION, NETWORK, ISDN PORTS AND GROUPS, EXTENSIONS, VOIP SERVER SETTINGS, JITTERBUFFER SETTINGS (which is highlighted), VPN CONFIGURATION, BACKUP AND RESTORE, SOFTWARE UPDATE, and PASSWORD. The main content area is titled 'JITTER BUFFER SETTING' and contains two sections: 'Jitterbuffer Optimization' and 'Channel Synchronization'. Under 'Jitterbuffer Optimization', there are three radio button options: 'Optimized for short delay' (selected), 'Optimized for low error rate', and 'Balanced between delay and error rate'. Under 'Channel Synchronization', there are two radio button options: 'Synchronize Channels' (selected) and 'No Synchronization'.

Local and remote administration

Web-based administration

The R&S®IP-GATE can be managed via a web interface from a computer connected over a LAN or WAN. The R&S®IP-GATE also has a built-in DHCP server to enable a computer to be connected directly to its LAN port. Remote management takes place over a dedicated VPN.

The web interface has pages for setting parameters that control communications with the VoIP server, for defining the jitter buffer's characteristics, and for configuring a VPN as well as the WAN, LAN and ISDN ports.

Setting parameters using configuration scripts

As an alternative to setting parameters via the web interface, users can create a configuration script containing a full set of parameters and download the script to the R&S®IP-GATE.

Software updates

The software in the R&S®IP-GATE can be updated. Software updates are signed centrally. The R&S®IP-GATE verifies the digital signature of software updates before it applies them.

The web interface.



Specifications

Specifications		
Encryption device	R&S®IP-GATE model	
ELCRODAT 6-2 S, version 7.70 and later	R&S®IP-GATE 2S0, R&S®IP-GATE 4S0	
ELCRODAT 6-2 M, version 7.70 and later	R&S®IP-GATE S2M	
R&S®MKS9680	R&S®IP-GATE 2S0, R&S®IP-GATE 4S0	
R&S®IP-GATE interfaces		
Power supply	plug-in power supply	115/230 V AC
R&S®IP-GATE 2S0	1 × WAN port	ETH 1000
	2 × ISDN BRI port	Euro-ISDN (DSS1)
	1 × LAN port for local management	ETH 100
	1 × USB port for downloading parameters	USB 2.0
R&S®IP-GATE 4S0	1 × WAN port	ETH 1000
	4 × ISDN BRI port	Euro-ISDN (DSS1)
	1 × LAN port for local management	ETH 100
	1 × USB port for downloading parameters	USB 2.0
R&S®IP-GATE S2M	1 × WAN port	ETH 1000
	1 × ISDN PRI port	Euro-ISDN (DSS1)
	1 × LAN port for local management	ETH 100
	1 × USB port for downloading parameters	USB 2.0
VoIP protocols supported by the R&S®IP-GATE		
SIP	RFC3261	
IAX2	RFC5456	
General data		
Dimensions (W × H × D)	R&S®IP-GATE 2S0, R&S®IP-GATE 4S0	approx. 206 mm × 77 mm × 230 mm (8.1 in × 3.0 in × 9.1 in)
Weight	R&S®IP-GATE 2S0, R&S®IP-GATE 4S0	approx. 1.8 kg (4.0 lb)

Ordering information

Designation	Type	Order No.
2 × Basic Rate Interface (BRI)	R&S®IP-GATE 2S0	5415.2580.02
4 × Basic Rate Interface (BRI)	R&S®IP-GATE 4S0	5415.2597.02
1 × Primary Rate Interface (PRI)	R&S®IP-GATE S2M	5415.2600.02
Software	R&S®VoIP-SERVER	5415.2651.02

Service you can rely on

- | Worldwide
- | Local and personalized
- | Customized and flexible
- | Uncompromising quality
- | Long-term dependability

About Rohde & Schwarz

Rohde & Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 75 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

Environmental commitment

- | Energy-efficient products
- | Continuous improvement in environmental sustainability
- | ISO 14001-certified environmental management system

Certified Quality System
ISO 9001

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