

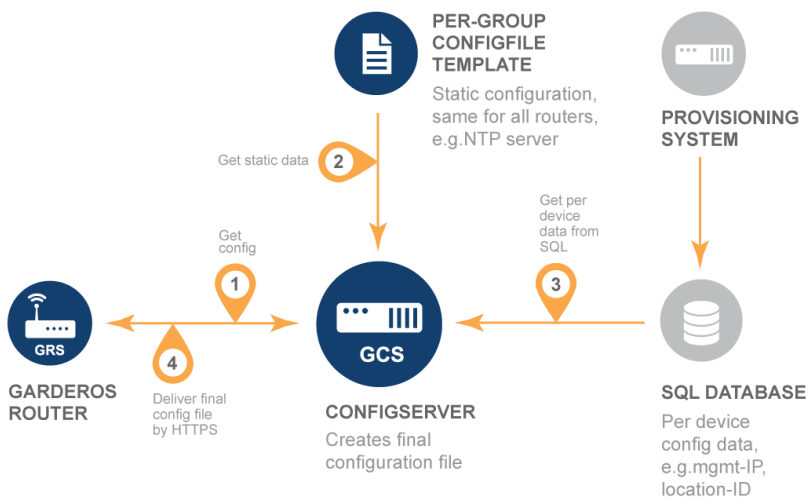


### Application and project description

Secure and reliable connectivity for professional industrial applications in telecommunications, energy supply and traffic surveillance. The Garderos R-7700 Series routers are specially manufactured for use in remote, difficult accessible locations with harsh environmental parameters. Due to the many uplink variants, the R-7700 Series can be used in a lot of different of applications.



### Core functions



- Central administration
- Scalable to several thousand routers with one web server
- Routers periodically check for updates
- Hardware- and configurable software-watchdogs for highest availability
- Standard interfaces for easy integration into existing infrastructure
- “Cyber Security“ by design, secure protocols and functions

## HARDWARE FEATURES

<b>Casing</b>	Material Dimensions (WxHxD) without / with connectors without / with connectors (xDSL type) Weight without / with xDSL Ingress protection IEC protection class Mounting	Diecast aluminium  44.5x110x115mm / 44.5x110x121mm 80.5x111x116mm / 80.5x111x121mm ~0.45kg / ~0.70kg IP40 3 Integrated DIN rail clip and mounting holes for external DIN rail clip or mounting bracket
<b>Temperature range</b>		Operating temperature range depends on router model. Please see "ordering information".
<b>Interfaces on casing</b>	Power connector Serial connector WWAN antenna connector Ethernet connector SFP connector WLAN antenna connector GPS antenna connector SIM card slot  DSL connector	Phoenix 2 pin 1x RJ-45 console/data + 1x D-Sub 9 (female) data (optional) up to 4x SMA (female) 2x RJ-45; additional 1x RJ-45 (optional) 1x SFP cage (optional) up to 2x RP-SMA (female) 1x SMA (female) (optional) 2x Mini-SIM (thermoresistant) or 1x Mini-SIM + 1x MFF-SIM chip (optional) 1x RJ-45 (depends on router model)
<b>Power supply</b>	Input voltage Power consumption	12-60 VDC (9,6VDC - 72VDC tolerance) ~4-15W
<b>Overheating protection</b>	ambient temperature	Off CPU >100°C on CPU < 80°C
<b>Serial interface</b>	RS-232 (console) RS-485 half-duplex (data) RS-232 (data)	1x 1x 1x (optional)
<b>WAN</b>	xDSL Ethernet (see LAN)	ADSL2+ (Annex A, B/J), VDSL2 (Annex B), Vectoring
<b>WWAN</b>	Technology CDMA EVDO, 1x CDMA RUIIM, non-RUIIM Passive GPS Dual WWAN	2G/3G <sup>1)</sup> , 2G/3G/4G <sup>2),7),9)</sup> , CDMA <sup>3)</sup> , 4G <sup>4),5)</sup> , 3G/4G <sup>6)</sup> , 2G/4G <sup>8)</sup> CDMA <sup>3)</sup> CDMA <sup>3)</sup> 2G/3G/4G <sup>2),9)</sup>
<b>LAN</b>	Ethernet  Autosensing Auto-MDix	2x 10/100/1000Base-T, add. 1x 10/100/1000Base-T or 1x SFP 1000Base-X (optional)
<b>WLAN</b>	Supported standards	802.11ac a/b/g/n
<b>Other features</b>	Hardware watchdog	Monitors "heartbeats" from router OS. Restarts router in case of software problems.
<b>Certifications</b>	Criteria for EMI immunity and radiation Vibration resistant Shock resistant	IEC 61850-3 (depends on router model) EN 60068-2-6:2008 EN 60068-2-27:2009
<b>Regulations</b>	RoHS, CE, FCC	

<sup>1)</sup> **2G/3G Module (European variant\*)**

WCDMA B1, B5, B8  
EDGE/GPRS/GSM  
850/900/1800/1900MHz

<sup>2)</sup> **2G/3G/4G Module (European variant\*)**

LTE B3, B7, B20  
WCDMA B1, B5, B8  
EDGE/GPRS/GSM 900/1800MHz

<sup>3)</sup> **CDMA 450MHz Module**

EV-DO Rev. A, B  
1xRTT  
R-UIM and non R-UIM

<sup>4)</sup> **4G Module, PPP Mode**

LTE B3, B7, B20, B31

<sup>5)</sup> **4G Module, QMI Mode**

LTE B3, B7, B20, B31

<sup>6)</sup> **3G/4G Module (CAT6)**

LTE B1, B3, B5, B7, B8, B18, B19,  
B21, B28, B38, B39, B40, B41  
WCDMA B1, B5, B6, B8, B9, B19

<sup>7)</sup> **2G/3G/4G Module (European variant\*)**

LTE B1, B3, B7, B8, B20  
WCDMA B1, B8  
EDGE/GPRS/GSM 900/1800MHz

<sup>8)</sup> **2G/4G Module (CAT1, European variant\*\*)**

LTE B1, B3, B7, B8, B20  
EDGE/GPRS/GSM 900/1800MHz

<sup>9)</sup> **2G/3G/4G Module (CAT4, global variant)**

LTE B1, B2, B3, B4, B5, B7, B8, B12, B13, B18, B19, B20,  
B26, B28, B38, B39, B40, B41  
WCDMA B1, B2, B4, B5, B6, B8, B19  
EDGE/GPRS/GSM 850/900/1800/1900MHz

\*other variants available e.g. for NA

## SOFTWARE FEATURES

### Operating system

- Garderos Router Software (GRS) Rel. 3.5

### Common

- IPv4
- IPv6
- IPv4/IPv6 dual stack
- IPv6 prefix delegation

### WWAN <sup>1)</sup>

- PPP over WWAN <sup>1), 2), 3), 4)</sup>
- Dual WAN (WWAN, Ethernet, VLAN) <sup>1), 2), 3), 4), 5), 6), 7), 8), 9)</sup>
- Dual WWAN (WWAN, WWAN) <sup>1), 2), 3), 4), 5), 6), 7), 8), 9)</sup>
- Configurable WWAN network selection <sup>1), 2), 4), 5), 6), 7), 8), 9)</sup>
- Configurable WWAN band selection <sup>6), 9)</sup>
- Multiple APN <sup>5), 7), 8)</sup>
- Intelligent APN selection <sup>2), 5), 7), 8), 9)</sup>
- IPv6 Prefix Delegation <sup>5), 7), 8)</sup>
- CDMA RUIIM and non-RUIIM <sup>3)</sup>
- CDMA ESN and MEID authentication <sup>3)</sup>

### WLAN <sup>1)</sup>

- 802.11ac a/b/g/n
- Access point and client mode
- Configurable channel
- Configurable transmit power
- Hidden SSID
- Intracell traffic blocking
- Multiple SSID
- WEP (64 and 128 bit), WPA and WPA2
- 802.1x
- EAP (802.11i, RADIUS authentication, TLS, SIM)

### Other network interfaces

#### Bridge

- Layer 2 bridge interface
- STP, RSTP
- IP assignment static IP, DHCP, IPv6 SLACC

#### Ethernet

- Configurable link speed
- IP assignment static IP, DHCP, IPv6 SLACC, PD
- Port mirroring

#### Local loop

- Local loop interface

#### PPPoE

- IP assignment static IP, PPPoE, IPv6 SLAAC
- PAP and CHAP
- Always on
- Time controlled session termination before provider reconnect

#### VLAN

- VLAN support (802.1q and priority tagging)
- IP assignment static IP, DHCP, IPv6 SLAAC, PD

### Routing

- Static routes (IPv4, IPv6)
- Static policy routing (IPv4, IPv6)
- Static routes to DHCP gateway (IPv4)
- Dynamic routing protocols RIPv2, OSPFv2, OSPFv3, BGPv4
- Filtering for dynamic routing protocols
- Firewall (IPv4, IPv6)
- Firewall (packet filter)
- Firewall (connection tracking)
- MAC address filter
- Invalid-packet-filter
- NAT (IPv4, IPv6)
- NAT (PAT and 1-to-1)
- Source-NAT (SNAT)
- Port forwarding
- Configurable MTU
- Path MTU discovery
- TCP MSS adjustment
- Diffserv (set DSCP bits based on IP-source/destination address and/or ports/protocols)
- QoS packet prioritization (bandwidth reservation based on IP-source/destination address and/or ports/protocols)
- Reverse path filter

### VPN

#### GRE

- GRE
- GRE IPv6
- Configurable MTU and MTU inherit
- GRE TAP
- GRE TAP IPv6

### IPsec

- IPsec IPv4, IPv6
- IKEv1, IKEv2
- Authentication: PSK, public key, RSA and ECDSA certificate
- Tunnel and transport mode
- VTI (virtual tunnel interface)
- Encryption algorithms AES, DES, 3DES, AES256
- Phase 1 key length up to 8192 bit
- Phase 1 elliptic curves
- Phase 2 key length up to 6144 bit
- Phase 2 elliptic curves
- Throughput max. 60 Mb/s
- Throughput (3des-sha1-modp1024) 21 Mb/s
- Throughput (aes-sha256-modp4096) 39 Mb/s
- VPN gateway
- Min. number tunnels: 5
- NHRP dynamic tunnel management

### L2TP

- Unmanaged L2TPv3 tunnel
- VLAN tagged L2TPv3 tunnel

### Open VPN

- PSK, user and certificate authentication
- Min. number tunnels: 5
- OpenVPN Layer 2 and 3
- Bridging OpenVPN Layer 2 Tunnel

### MIP

- Mobile IP foreign agent

### Router management

- RS-232 management console
- Administrator authentication by TACACS+, RADIUS, password file and public key authentication
- Administrator roles
- Command line interface (CLI)
- Remote configuration file download (HTTP/HTTPS)
- OSCP (configuration file download)
- HTTP basic authentication for config-file download
- Certificate authentication for configuration file download
- Remote software updates
- Central bulk management of routers

### Services

- Cronjob
- DHCP server (IPv4+IPv6)
- DHCP relay (IPv4+IPv6)
- DHCP snooping (IPv4)
- DHCP address pools per VLAN/interface
- DHCP secure ARP
- DHCP ARP ping before assigning lease
- DHCP accounting (RADIUS)
- DNS server and proxy
- DynDNS client
- Ethernet port security (sticky MAC detection)
- Hotspot portal
- IPv6 SLAAC daemon
- LLDP
- NMEA <sup>2), 9)</sup>
- NTP client, server
- NTP with MD5 authentication
- SNMPv2 and SNMPv3
- SNMP monitoring and traps
- SSH client, server
- Syslog local, remote, persistent in flash
- Telnet client, server

### Other functions

- Configurable LED (also project based)
- Hardware and software watchdogs
- LXC virtualization (project based)
- Link monitor (ping)
- Security hardening (switch off unsecure features)
- Encrypted configuration
- Serial-to-network proxy (ser2net)
- Serial modes: Console, Off and Script
- Scripting interface
- Open APIs for network integration

<sup>1)</sup> Prerequisite is a suitable interface.  
<sup>1), 2), 3), 4), 5), 6), 7), 8), 9)</sup> Please see "Hardware Features".

## ORDERING INFORMATION

Garderos model number:	Ethernet (10/100/1000 Base-T)	SFP (1000Base-X); optional	RS-232 (console)	RS-232 (data); optional	WLAN (802.11ac a/b/g/n)	xDSL	2G/3G Module <sup>1)</sup>	2G/3G/4G Module <sup>2), 7), 9)</sup> 4G Module <sup>4), 5)</sup> 3G/4G Module <sup>6)</sup> 2G/4G Module <sup>8)</sup>	CDMA 450 Module <sup>3)</sup>	Maximum operating temperature range (The temperature range may differ depending on the router variant)
R-7701 (2xLAN/WLAN)	2+1 (opt.)	1	1	1	1					-25°C to +70°C
R-7707 (2xLAN)	2+1 (opt.)	1	1	1						-40°C to +75°C
R-7711 (2x LAN/xDSL/WLAN)	2		1	1	1	1				-25°C to +60°C
R-7717 (2x LAN/xDSL)	2		1	1		1				-35°C to +60°C
R-7721 (2xLAN/3G/WLAN)	2+1 (opt.)	1	1		1		1			-25°C to +70°C
R-7722 (2xLAN/4G/WLAN)	2+1 (opt.)	1	1		1			1		-25°C to +70°C
R-7727 (2xLAN/3G)	2+1 (opt.)	1	1	1			1			-40°C to +75°C
R-7728 (2xLAN/4G)	2+1 (opt.)	1	1	1				1		-40°C to +75°C
R-7731 (2x LAN/xDSL/CDMA/WLAN)	2		1	1	1	1			1	-35°C to +60°C
R-7737 (2x LAN/xDSL/CDMA)	2		1	1		1			1	-35°C to +60°C
R-7747 (2xLAN/3G/CDMA)	2+1 (opt.)	1	1				1		1	-35°C to +75°C
R-7748 (2xLAN/4G/CDMA)	2+1 (opt.)	1	1					1	1	-35°C to +75°C
R-7749 (2xLAN/CDMA/CDMA)	2+1 (opt.)	1	1						2	-35°C to +75°C
R-7757 (2xLAN/3G/4G)	2+1 (opt.)	1	1				1	1		-40°C to +75°C
R-7758 (2xLAN/4G/4G)	2+1 (opt.)	1	1					2		-40°C to +75°C
R-7759 (2xLAN/3G/3G)	2+1 (opt.)	1	1				2			-40°C to +75°C
R-7761 (2x LAN/xDSL/3G/WLAN)	2		1		1	1	1			-25°C to +60°C
R-7762 (2x LAN/xDSL/4G/WLAN)	2		1		1	1		1		-25°C to +60°C
R-7767 (2x LAN/xDSL/3G)	2		1	1		1	1			-35°C to +60°C
R-7768 (2x LAN/xDSL/4G)	2		1	1		1		1		-35°C to +60°C
R-7771 (2xLAN/CDMA/WLAN)	2+1 (opt.)	1	1		1				1	-25°C to +70°C
R-7777 (2xLAN/CDMA)	2+1 (opt.)	1	1	1					1	-35°C to +75°C

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