

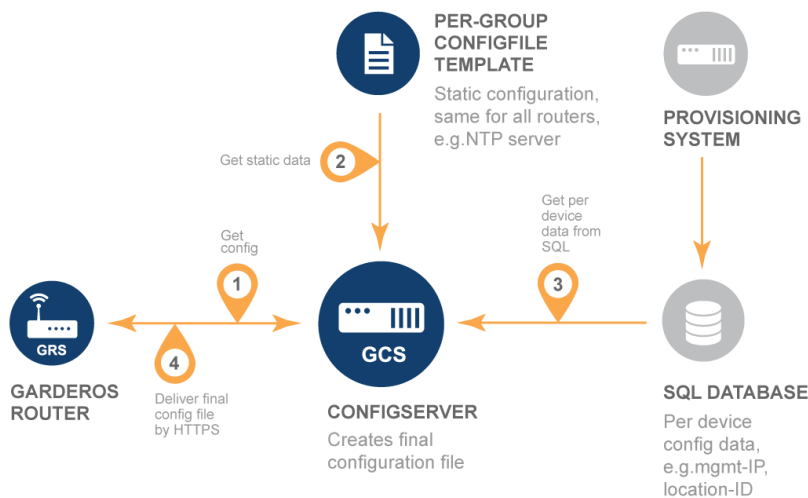


Application and project description

Garderos routers provide cyber-secure and reliable data connectivity for large-scale router networks in telecommunications and utility networks, as well as intelligent traffic systems. The Garderos R-7600 Series routers provide 2 LAN ports and optional wireless WAN interfaces such as Public Cellular and Private LTE. Failover between a wireless WAN interface and an Ethernet port configured as a WAN port is possible. Also available in an extended version with additional I/Os and RS-485 interfaces (see separate data sheet).



Fig. 1: Garderos R-7600 single radio routers optimized for smart grid.



Core functions

- Central administration
- Scalable up to 10,000 routers with one server
- Routers periodically query server for new firmware or configuration
- Hardware and software watchdogs for highest availability
- Standard interfaces in GCS for easy integration with existing infrastructure
- Cyber security by design: secure protocols and functions

Casing	<p>Material Diecast aluminum</p> <p>Dimensions (WxHxD) without / with connectors 44,5x110x115mm / 44,5x110x121mm 80.5x111x116mm / 80.5x111x122mm (with add. connectors)</p> <p>Weight ~0.45kg ~0.7kg</p> <p>Ingress protection IP40</p> <p>IEC protection class 3</p> <p>Mounting Integrated DIN rail clip and mounting holes for external DIN rail clip or mounting bracket</p>
Temperature range	Operating temperature range depends on router model. Please see "ordering information".
Interfaces on casing	<p>Power connector Phoenix 2 pin</p> <p>Ethernet connector 2x RJ-45</p> <p>Serial connector 1x RJ-45 console/data 1x D-Sub 9 (Female) data (optional)</p> <p>WWAN antenna connector up to 2x SMA (Female)</p> <p>GPS antenna connector 1x SMA (Female) (optional)</p> <p>I/O connector Phoenix 4-in PCB clamp (optional)</p> <p>SIM card slot 1x Mini-SIM (heat resistant) or 1x MFF-SIM chip (optional)</p>
Power supply	<p>Input voltage 12-24 VDC (9,6VDC - 28VDC tolerance)</p> <p>Power consumption ~2-5W</p>
Serial interface	<p>RS-232 (console) 1x</p> <p>RS-485 half-duplex (data) 1x</p> <p>RS-232 (data) 1x (optional)</p>
Digital I/O	Input/Output 1x/1x or 2x/0x (optional)
WAN	Ethernet (siehe LAN)
WWAN	<p>Technology 2G/3G/4G ¹⁾, 4G/5G Redcap ²⁾, 4G ³⁾, 2G/4G ⁴⁾</p> <p>Passive GPS/A-GPS Yes (optional) ^{1, 2)}</p>
LAN	Ethernet Autosensing Auto-MDIX 2x 10/100 Base-T
Other features	Hardware watchdog Monitors "heartbeats" from router OS. Restarts router in case of software problems.
Certifications	<p>Criteria for EMI immunity and radiation IEC 61000-6-2:2005</p> <p>Vibration resistant EN 60068-2-6:2008</p> <p>Shock resistant EN 60068-2-27:2009</p>
Regulations	RoHS, CE

¹⁾ **2G/3G/4G Module (CAT 4, 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

²⁾ **4G/5G Module (5G RedCap, LTE Cat4)**

5G RedCap n1/n2/n3/n5/n7/n8/n12/n13/n14/n18/n20/n25/n26/n28/n30/n38/n40/n41/n48/n66/n70/n71/n77/n78/n79
LTE -FDD B1/B2/B3/B4/B5/B7/B8/B12/B13/B14/B17/B18/B19/B20/B25/B26/B28/B30/B66/B70/B71
LTE -TDD B34/B38/B39/B40/B41/B42/B43/B48

³⁾ **4G Module (CAT 4, European variant*)**

LTE/LTE450 B3, B7, B20, B31, B72

⁴⁾ **2G/4G Module (CAT M1, European variant*)**

LTE/LTE450 B1, B2, B3, B4, B5, B8, B12, B13, B14, B18, B19, B20, B25, B26, B27, B28, B31, B66, B72, B85
EDGE/GPRS/GSM 850/900/1800/1900MHz

*other variants available

SOFTWARE FEATURES

Operating system

- Garderos Router Software (GRS) Rel. 3.8

Common

- IPv4, IPv6
- IPv4/IPv6 dual stack
- Multiple IP addresses per interface
- IPv6 prefix delegation

WWAN *)

- PPP over WWAN ⁴⁾
- Dual WAN (WWAN, Ethernet, VLAN) ^{1, 2, 3, 4)}
- Configurable WWAN network selection ^{1, 2, 3, 4)}
- Configurable WWAN band selection ^{1, 2, 3, 4)}
- Multiple APN ^{1, 2, 3)}
- Intelligent APN selection ^{1, 2, 3, 4)}
- WWAN IPv4 ^{1, 2, 3, 4)}
- WWAN IPv6 ^{1, 2, 3)}
- WWAN dual stack ^{1, 2, 3)}
- IPv6 prefix delegation ³⁾
- Modem firmware update ^{1, 3)}
- XCAL debugging ³⁾

Other network interfaces

Bridge

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

Ethernet

- Configurable link speed
- IP assignment static IP, DHCP, IPv6 SLAAC, PD
- Port mirroring
- 802.1x

Local Loop

- Local loop interface
- IP assignment static IP, PD

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
- 802.1x

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, packet filter, connection tracking, bridge filter)
- MAC address filter, Invalid-packet-filter
- NAT (IPv4, IPv6, PAT, 1-to-1, SNAT, port forwarding)
- Synchronous routing
- Configurable MTU
- Path MTU discovery
- TCP MSS adjustment
- Diffserv (set DSCP bits)
- QoS packet prioritization
- Reverse path filter

VPN

GRE

- GRE, GRE IPv6, GRE TAP, GRE TAP IPv6
- Configurable MTU and MTU inherit
- NHRP dynamic tunnel management

mGRE

- Configurable MTU and MTU inherit
- NHRP dynamic tunnel management
- NHRP 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, AES192, AES256, CCM+GCM, DES, 3DES
- RSA key length up to 8192 bit, elliptic curves
- Throughput max. 41 Mb/s
- Throughput (3des-sha1-modp1024) 10 Mb/s
- Throughput (aes-sha256-modp4096) 23 Mb/s
- VPN gateway
- Min. number tunnels: 5

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
- Encryption algorithms AES, AES192, AES256, CCM+GCM, Blowfish, DES, 3DES

MIP

- Mobile IP foreign agent

Router management

- RS-232 management console
- Authentication by TACACS+, RADIUS, password file and public key
- Administrator roles
- Command line interface (CLI)
- Remote configuration file download (HTTP/HTTPS)
- Trigger based configuration selection
- OCSP
- Authentication by HTTP basic auth and certificate
- 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)
- Static DHCP (MAC)
- DNS server and proxy
- DynDNS client
- EST (Enrolment over Secure Transport)
- Ethernet port security (sticky MAC detection)
- Hotspot portal
- IPv6 SLAAC daemon
- LLDP
- MQTT (I/O control) *)
- NMEA ^{1, 2)}
- NTP client, server, MD5, local time source
- SCEP (Simple Certificate Enrolment Protocol)
- SNMPv2 and SNMPv3, monitoring and traps
- SNTP (Simple NTP)
- 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, busybox and Alpine (project based)
- Status monitor (ping, interface status, IPv6-RS, RX-TX, script)
- Reset to factory defaults
- Customer defined factory defaults
- Security hardening (switch off unsecure features)
- Encrypted configuration
- Secure Boot
- Serial-to-network proxy (ser2net), IPv4/IPv6, TCP/UDP
- Serial modes: Console, Off and Script
- Scripting interface
- Open APIs for network integration

*) Prerequisite is a suitable interface.
1, 2, 3, 4) Please see "Hardware Features".

ORDERING INFORMATION

Garderos model number:	Ethernet (10/100 Base-T)	RS-232 (console)	RS-232 (data); optional	RS-485 (data)	Digital I/O; optional ¹⁾	2G/3G/4G Module ¹⁾ 4G/5G Module ²⁾ 4G Module ³⁾ 2G/4G Module ⁴⁾	Maximum operating temperature range (The temperature range may differ depending on the router variant)
R-7607 (2xLAN)	2	1	1	1	1		-25°C to +75°C
R-7628 (2xLAN/4G or 5G Redcap)	2	1	1	1	1	1	-25°C to +75°C

^{1, 2, 3, 4)} Please see "Hardware Features".

¹⁾ Options:

- 2x Input
- 1x Input, 1x Output (NO)
- 1x Input, 1x Output (NC)

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