



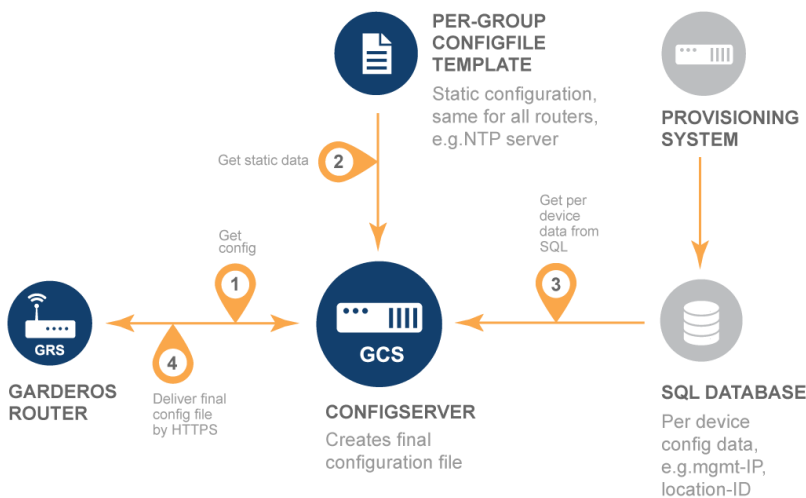
### Application and project description

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.



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

<b>Casing</b>	Material Dimensions (WxHxD) without / with connectors Weight without Ingress protection IEC protection class Mounting	Diecast aluminum  44,5x110x115mm / 44,5x110x121mm ~0.45kg 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 Ethernet connector Serial connector WWAN antenna connector GPS antenna connector I/O connector SIM card slot	Phoenix 2 pin 2x RJ-45 1x RJ-45 console/data + 1x D-Sub 9 (Female) data (optional) up to 2x SMA (Female) 1x SMA (Female) (optional) Phoenix 4 Pin-PCB clamp (optional) 1x Mini-SIM (heat resistant) or 1x MFF-SIM chip (optional)
<b>Power supply</b>	Input voltage Power consumption	12-24 VDC (9,6VDC - 28VDC tolerance) ~2-5W
<b>Serial interface</b>	RS-232 (console) RS-485 half-duplex (data) RS-232 (data)	1x 1x 1x (optional)
<b>Digital I/O</b>	Input / Output	1x/1x or 2x/0x (optional)
<b>WAN</b>	Ethernet (siehe LAN)	
<b>WWAN</b>	Technology CDMA EVDO, 1x CDMA RUIIM, non-RUIIM Passive GPS	2G/3G/4G <sup>1)</sup> , 4G <sup>2)</sup> , 2G/4G <sup>3)</sup> , CDMA <sup>4)</sup> CDMA <sup>4)</sup> CDMA <sup>4)</sup> 2G/3G/4G <sup>1)</sup>
<b>LAN</b>	Ethernet Autosensing Auto-MDIX	2x 10/100 Base-T
<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 61000-6-2:2005 EN 60068-2-6:2008 EN 60068-2-27:2009
<b>Regulations</b>	RoHS, CE	

<sup>1)</sup> **2G/3G/4G Modul (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

<sup>2)</sup> **4G Modul (CAT 4, European variant\*)**

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

<sup>3)</sup> **2G/4G Modul (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

<sup>4)</sup> **CDMA 450MHz Modul**

EV-DO Rev. A, B

1xRTT

R-UIM und non R-UIM

\*other variants available

## SOFTWARE FEATURES

### Operating system

- Garderos Router Software (GRS) Rel. 3.7

### Common

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

### WWAN \*)

- PPP over WWAN 3, 4)
- Dual WAN (WWAN, Ethernet, VLAN) 1, 2, 3, 4)
- Configurable WWAN network selection 1, 2, 3)
- Configurable WWAN band selection 1, 2, 3)
- Multiple APN 2)
- Intelligent APN selection 1, 2)
- WWAN IPv4 1, 2, 3, 4)
- WWAN IPv6 1, 2, 4)
- WWAN dual stack 1, 2, 4)
- IPv6 prefix delegation 2, 4)
- Modem firmware update 2)
- XCAL debugging 2)
- CDMA RUIIM and non-RUIIM 3)
- CDMA ESN and MEID authentication 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)
- 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:

<sup>1, 2, 3, 4</sup> Please see "Hardware Features".

	Ethernet (10/100 Base-T)	RS-232 (console)	RS-232 (data); optional	Digital I/O; optional	CDMA 450 Module <sup>4)</sup>	2G/3G/4G Modul <sup>1)</sup> 4G Modul <sup>2)</sup> 2G/4G Modul <sup>3)</sup>	Maximum operating temperature range (The temperature range may differ depending on the router variant)
R-7607 (2xLAN)	2	1	1	1			-25°C to +75°C
R-7628 (2xLAN/4G)	2	1	1	1		1	-25°C to +75°C
R-7677 (2xLAN/CDMA)	2	1	1	1	1		-25°C to +75°C

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