

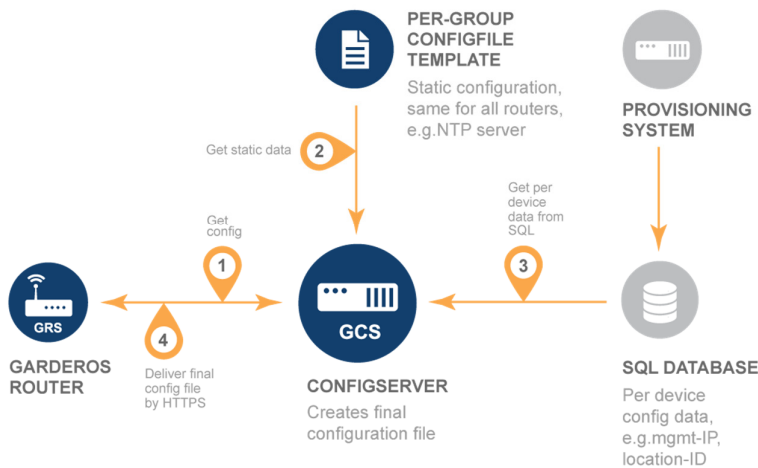


Application and project description

Secure and reliable connectivity for professional industrial applications in telecommunications, energy supply and traffic surveillance. The multi-functional Garderos R-7800 Series routers are specially manufactured for use in remote, difficult accessible locations with harsh environmental parameters, such as extreme temperatures.

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

Casing	<p>Material Diecast aluminium</p> <p>Dimensions (WxHxD) without / with 80.5x111x116mm / 80.5x111x121mm</p> <p>Weight ~0.75kg</p> <p>Ingress protection IP40</p> <p>IEC protection class 3</p> <p>Mounting DIN rail mountable (integrated DIN rail clip and mounting holes for external DIN rail clip) or use as desktop device</p>
Temperature range	<p>Operating temperature range depends on router model. Please see "ordering information".</p>
Interfaces on casing	<p>Power connector Phoenix 2 pin</p> <p>Serial connector 1x RJ-45 console/data + 1x D-Sub 9 (female) data (optional)</p> <p>WWAN antenna connector up to 3x SMA (female)</p> <p>Ethernet connector 5x RJ-45; additional 1x RJ-45 (opt., see ordering inform.)</p> <p>WLAN antenna connector up to 2x RP-SMA (female)</p> <p>SIM card slot 2x Mini-SIM (thermoresistant) or 1x Mini-SIM + 1x MFF-SIM chip (optional)</p> <p>DSL connector 1x RJ-45 (depends on router model)</p> <p>USB connector 1x USB 2.0 type Mini-B Host (optional)</p>
Power supply	<p>Input voltage 12-60 VDC</p> <p>Power consumption ~5-16W</p>
Serial interface	<p>RS-232 (console) 1x</p> <p>RS-485 half-duplex (data) 1x</p> <p>RS-232 (data) 1x (optional)</p>
WAN	<p>xDSL ADSL2+ (Annex A,B/J), VDSL2 (Annex B), Vectoring</p> <p>Ethernet (see LAN)</p>
WWAN interface	<p>Technology/Bands 2G/3G ¹⁾, 2G/3G/4G ²⁾, CDMA ³⁾, 4G ^{4), 5)}</p> <p>CDMA EVDO, 1x for CDMA ³⁾</p> <p>CDMA RUIIM, non-RUIIM for CDMA ³⁾</p> <p>Dual WWAN</p>
LAN interface	<p>Ethernet 5x 10/100/1000BT add. 1x 10/100/1000BT (optional)</p> <p>Autosensing Auto-MDix</p>
WLAN interface	<p>Supported standards 1x 802.11n a/b/g or 1x 802.11n b/g</p>
Other features	<p>Hardware watchdog Monitors "heartbeats" from router OS. Restarts router in case of software problems.</p> <p>Cryptographic hardware accelerator md5, aes, des, 3des, sha1, sha512</p>
Certifications	<p>Criteria for EMI immunity and radiation IEC 61850-3</p> <p>Vibration resistant EN 60068-2-6:2008</p> <p>Shock resistant EN 60068-2-27:2009</p>
Regulations	<p>RoHS, CE, FCC</p>

¹⁾ **2G/3G Module**

WCDMA
800/850/900/AWS1700/1900/2100MHz
EDGE/GPRS/GSM
850/900/1800/1900MHz
HSPA+ peak download speed: 21.1 Mbps
HSPA+ peak upload speed: 5.76 Mbps

²⁾ **2G/3G/4G Module (European variant*)**

LTE 800/1800/2600 MHz
WCDMA 900/2100MHz
EDGE/GPRS/GSM 900/1800/1900MHz
HSPA+ peak download speed: 21.1 Mbps
HSPA+ peak upload speed: 5.76 Mbps
LTE peak download speed: 100 Mbps
LTE peak upload speed: 50 Mbps

*other variants available e.g. for NA

³⁾ **CDMA 450MHz**

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

⁴⁾ **4G Module, PPP mode**

LTE 450/800/1800/2600
LTE peak download speed:100 Mbps
LTE peak upload speed: 50 Mbps

⁵⁾ **4G Module, QMI mode**

LTE 450/800/1800/2600
LTE peak download speed:100 Mbps
LTE peak upload speed: 50 Mbps

ROUTING FEATURES

Operating system

- Garderos Router Software (GRS) Rel. 3.2

Common

- IPv4
- IPv6
- IPv4/IPv6 dual stack

WWAN ¹⁾

- PPP over WWAN ^{1), 2), 3), 4)}
- Dual WAN (Cellular, Ethernet, VLAN) ^{1), 2), 3), 4), 5)}
- Dual WWAN (WWAN, WWAN) ^{1), 2), 3), 4), 5)}
- Multiple APN ⁵⁾
- Intelligent APN selection ^{2), 5)}
- CDMA RUIM and non-RUIM ³⁾
- CDMA ESN and MEID authentication ³⁾

WLAN ¹⁾

- 802.11n a/b/g or 802.11n b/g
- 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
- IP assignment static IP, DHCP, IPv6 SLACC

Ethernet

- Configurable link speed
- IP assignment static IP, DHCP, IPv6 SLACC
- Port mirroring
- Switching
- Switch port separation
- Switch VLANs up to 16
- Switch 802.1q VLAN tagged and untagged
- Switch with Layer 2 multicast/broadcast

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

Routing

- Static routes (IPv4, IPv6)
- Dynamic routing protocols RIPv2, OSPFv2, 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
- PSK and certificate authentication
- Tunnel and transport mode
- Encryption algorithms AES, DES, 3DES, AES256
- Phase 1 key length up to 8192 bit
- Phase 2 key length up to 6144 bit
- Throughput max. 119 Mb/s
- Throughput (3des-sha1-modp1024) 105 Mb/s
- Throughput (aes-sha256-modp4096) 119 Mb/s
- VPN gateway
- Min. number tunnels: 5
- NHRP dynamic tunnel management

Open VPN

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

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)
- OCSP (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)
- DHCP relay (IPv4+IPv6)
- 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)
- IPv6 SLAAC daemon
- 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)
- Serial-to-network proxy (ser2net)
- Serial modes: Console, Off and Script
- Scripting interface
- Open APIs for network integration

¹⁾ Prerequisite is a suitable interface.
^{1), 2), 3), 4), 5)} Please see "Hardware Features".

ORDERING INFORMATION

Garderos model number:	Ethernet (10/100/1000 BT)	RS-232 (console)	WLAN (802.11n a/b/g or 802.11n b/g)	xDSL	2G/3G Module ¹⁾	2G/3G/4G EU-Module ²⁾ or 4G Module ^{4), 5)}	CDMA 450MHz ³⁾	Maximum operating temperature range (The temperature range may differ depending on the router variant)
	^{1), 2), 3), 4), 5)} Please see "Hardware Features".							
R-7801 (5x LAN/WLAN)	5+1 (opt.)	1	1					-40 °C to +75 °C
R-7807 (5x LAN)	5+1 (opt.)	1						-40 °C to +75 °C
R-7811 (5x LAN/xDSL/WLAN)	5	1	1	1				-35 °C to +70 °C
R-7817 (5x LAN/xDSL)	5	1		1				-35 °C to +70 °C
R-7821 (5x LAN/3G/WLAN)	5+1 (opt.)	1	1		1			-40 °C to +75 °C
R-7822 (5x LAN/4G/WLAN)	5+1 (opt.)	1	1			1		-40 °C to +75 °C
R-7827 (5x LAN/3G)	5+1 (opt.)	1			1			-40 °C to +75 °C
R-7828 (5x LAN/4G)	5+1 (opt.)	1				1		-40 °C to +75 °C
R-7831 (5x LAN/xDSL/CDMA/WLAN)	5	1	1	1			1	-35 °C to +70 °C
R-7837 (5x LAN/xDSL/CDMA)	5	1		1			1	-35 °C to +70 °C
R-7847 (5x LAN/3G/CDMA)	5+1 (opt.)	1			1		1	-40 °C to +75 °C
R-7848 (5x LAN/4G/CDMA)	5+1 (opt.)	1				1	1	-40 °C to +75 °C
R-7857 (5x LAN/3G/4G)	5+1 (opt.)	1			1	1		-40 °C to +75 °C
R-7858 (5x LAN/4G/4G)	5+1 (opt.)	1				2		-40 °C to +75 °C
R-7859 (5x LAN/3G/3G)	5+1 (opt.)	1			2			-40 °C to +75 °C
R-7861 (5x LAN/xDSL/3G/WLAN)	5	1	1	1	1			-35 °C to +70 °C
R-7862 (5x LAN/xDSL/4G/WLAN)	5	1	1	1		1		-35 °C to +70 °C
R-7867 (5x LAN/xDSL/3G)	5	1		1	1			-35 °C to +70 °C
R-7868 (5x LAN/xDSL/4G)	5	1		1		1		-35 °C to +70 °C
R-7871 (5x LAN/CDMA/WLAN)	5+1 (opt.)	1	1				1	-40 °C to +75 °C
R-7877 (5x LAN/CDMA)	5+1 (opt.)	1					1	-40 °C to +75 °C

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