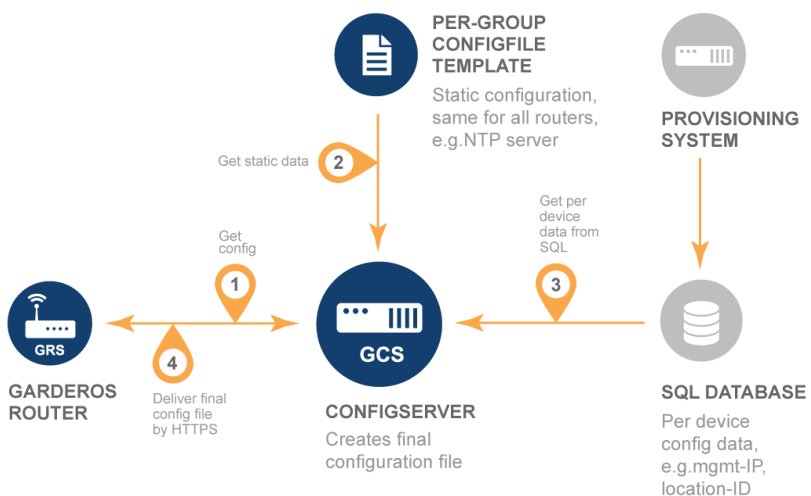## Application and project description

Secure and reliable connectivity for professional industrial applications in telecommunications, energy supply and traffic surveillance. The multi-functional Garderos R-7900 Series routers are specially manufactured for use in remote, difficult accessible locations with harsh environmental parameters. Optimized single radio router for large scale deployment in smart-grid and smart-meter applications.

PER-GROUP CONFIGFILE TEMPLATE
Static configuration, same for all routers, e.g.NTP server

Get static data **2**

PROVISIONING SYSTEM

Get per device data from SQL

Get config

1

GRS

3

4

GARDEROS ROUTER

Deliver final config file by HTTPS

GCS

CONFIGSERVER
Creates final configuration file

SQL DATABASE
Per device config data, e.g.mgmt-IP, location-ID

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

Casing	Material	Diecast aluminium
	Dimensions (WxHxD) without / with	80.5x111x116mm / 80.5x111x121mm
	Weight	~0.75kg
	Ingress protection	IP40
	IEC protection class	3
	Mounting	Integrated DIN rail clip and mounting holes for external DIN rail clip or mounting bracket
Temperature range		Operating temperature range depends on router model. Please see "ordering information".
Interfaces on casing	Power connector	Phoenix 2 pin
	Serial connector	1x RJ-45 (console) + 2 pin PCB clamp (RS-485, data) + 1x D-Sub 9 (Female) (RS-232, data) (optional)
	WWAN antenna connector	up to 2x SMA (female)
	Ethernet connector	5x RJ-45
	GPS antenna connector	1x SMA (female) (optional)
	SIM card slot	1x Mini-SIM (thermoresistant) or 1x MFF-SIM chip (optional)
	DSL connector	1x RJ-45 (depends on router model)
Power supply	Input voltage	12-24 VDC (9,6VDC - 28VDC tolerance)
	Power consumption	~2-7W
Serial interface	RS-232 (console)	1x
	RS-485 half-duplex (data)	1x
	RS-232 (data)	1x (optional)
WAN	xDSL	ADSL2+,VDSL2, PTM/ATM Mode
	Ethernet (see LAN)	
WWAN	Technology	2G/3G[1], 2G/3G/4G[2,7,9], CDMA[3], 4G[4,5], 3G/4G[6], 2G/4G[8]
	CDMA EVDO, 1x	CDMA[3]
	CDMA RUIM, non-RUIM	CDMA[3]
	Passive GPS	2G/3G/4G[2,9]
LAN	Ethernet	1x 10/100BT + 4-Port 10/100BT Managed Switch or 5-Port 10/100BT Managed Switch (at xDSL-router typs)
	Autosensing Auto-MDIx	
Other features	Hardware watchdog	Monitors "heartbeats" from router OS. Restarts router in case of software problems.
Certifications	Criteria for EMI immunity and radiation	IEC 61000-6-2:2005
	Vibration resistant	EN 60068-2-6:2008
	Shock resistant	EN 60068-2-27:2009
Regulations	RoHS, CE	

[1] **2G/3G Module (European variant*)**
WCDMA B1, B5, B8
EDGE/GPRS/GSM 850/900/1800/1900MHz

[2] **2G/3G/4G Module (European variant*)**
LTE B3, B7, B20
WCDMA B1, B5, B8
EDGE/GPRS/GSM 900/1800MHz

[3] **CDMA 450MHz Module**
EV-DO Rev. A, B
1xRTT
R-UIM and non R-UIM

*other variants available e.g. for NA

[4] **4G Module, PPP Mode**
LTE B3, B7, B20, B31

[5] **4G Module, QMI Mode**
LTE B3, B7, B20, B31

[6] **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

[7] **2G/3G/4G Module (European variant*)**
LTE B1, B3, B7, B8, B20
WCDMA B1, B8
EDGE/GPRS/GSM 900/1800MHz

[8] **2G/4G Module (CAT1, European variant*)**
LTE B1, B3, B7, B8, B20
EDGE/GPRS/GSM 900/1800MHz

[9] **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

GARDEROS.

Operating system
- Garderos Router Software (GRS) Rel. 3.5

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

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

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
- 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, 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. 41 Mb/s
- Throughput (3des-sha1-modp1024) 10 Mb/s
- Throughput (aes-sha256-modp4096) 23 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)
- 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+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 [2), 9)]
- 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
- Secure Boot
- Serial-to-network proxy (ser2net)
- Serial modes: Console, Off and Script
- Scripting interface
- Open APIs for network integration

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

GARDEROS.

Garderos model number: ———— 1), 2), 3), 4), 5), 6), 7), 8), 9) Please see "Hardware Features".	Ethernet (10/100 Base-T)	Ethernet (n-Port 10/100BT Managed Switch	RS-485 (data)	RS-232 (data); optional	xDSL	2G/3G/4G Module 2), 7), 9) 4G Module 4), 5) 3G/4G Module 6) 2G/4G Module 8)	CDMA 450 Module 3)	Maximum operating temperature range (The temperature range may differ depending on the router variant)
R-7907 (5xLAN)	1	4	1					-25°C to +75°C
R-7917 (5xLAN/xDSL)		5	1	1	1			-25°C to +65°C
R-7928 (5xLAN/4G)	1	4	1			1		-25°C to +75°C
R-7937 (5xLAN/xDSL/CDMA)		5	1	1	1		1	-25°C to +65°C
R-7968 (5xLAN/xDSL/4G)		5	1	1	1	1		-25°C to +65°C
R-7977 (5xLAN/CDMA)	1	4	1				1	-25°C to +75°C

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