WAVENET
RADIO NETWORK 3065

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Simons≡Voss
technologies

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NOTE.

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1.0   INTRODUCTION.

In the text that follows, the components of the System 3060 (locking cylinders, Smart Relays, shunt lock) are always referred to as lock(s) and door(s). Unless explicitly stated otherwise, the information given applies to all other components of the System 3060.

Up to a certain system size, or for customers with a small number of doors, it is advisable to program the System 3060 with a laptop and SmartCD, as this generally means that fewer changes have to be made to the lock configuration.

For medium-sized or larger systems where lost keys, authorisation for new transponders and organisational changes are more frequent, it is advisable to update and maintain the locking system over the network. However, not all doors necessarily need to be networked. The entire system can be configured for combined operation (networking / stand-alone).

In a networked system, not only can all maintenance and programming tasks be performed on a central PC, the current status of the entire network can be interrogated. You can query lock and door statuses such as Door open – Door closed, Door unlocked – Door locked, Battery warning and Access list from a central point. This allows you to respond directly to an event from a central point.

WaveNet is a simple-to-install 'plug and play' network for use in building automation. Because it is installed with no wires, it is particularly suitable for online administration and management of the SimonsVoss digital locking and organisation system 3060 in existing buildings; it can however also be used in new buildings (e.g. in flexible-use areas).

Data transfer within a WaveNet network depends heavily on the transmission medium. Data can be transmitted via RS485 interfaces, Ethernet interfaces (TCP/IP), USB interfaces, RS232 interfaces, radio interfaces (868 MHz) and also WLAN.

In summary, networking allows the entire access control system to be configured and monitored from a central PC. This enables the user to respond immediately to critical situations.

We would recommend that you take advantage of the WaveNet training offered at SimonsVoss or WaveNet project planning with a SimonsVoss service technician.

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2.0   NOMENCLATURE.

WN   →   WaveNet

LN   →   LockNode

RN   →   RouterNode

RP   →   RepeaterNode

CN   →   CentralNode

S   →   Serial (RS232)

R   →   Radio (868 MHz)

C   →   Cable (RS485)

U   →   USB

I   →   Inside

E   →   Ethernet (TCP/IP)

W   →   WLAN

X   →   Placeholder for user's choice of transmission medium

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3.0   TRANSMISSION MEDIA.

WaveNet supports the following transmission media for the transfer of data within the system:

- RS485 bus cabling for connecting individual WaveNet routers and repeaters as network backbone (cable type: CAT 5, screened, max. cable length 900 m). **WN.RN.(X)C, WN.RN.C(X), WN.RP.CC**, **WN.CN.(X)C**
- RS485 bus cabling for connecting individual WaveNet LockNodes as wired WaveNet. **WN.LN.C**
- Internet or Intranet via TCP/IP for data transfer within an Ethernet network (10/100 Base T) or WLAN from various WaveNet networks. **WN.RN.EC, WN.RN.ER, WN.RN.WC, WN.RN.WR**
- USB, for data transfer between a PC and the WaveNet central node. **WN.CN.UC, WN.CN.UR** (cable length 1.5 m)
- RS232, for data transfer between a PC and the WaveNet central node. **WN.CN.SC, WN.CN.SR** (maximum cable length 2 m)
- 868 MHz radio (radio range approx. 20 - 40 m, depending on building structure) **WN.RN.(X)R, WN.RN.R(X), WN.CN.(X)R, WN.LN.R/I**
- B-field 25 kHz (radio range approx. 30 cm), for data transfer between the WaveNet LockNode and the SimonsVoss lock (e.g. locking cylinder, Smart Relay, etc.)

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4.0   USABLE RADIO BANDS.

The modern radio technologies used in security technology should not be confused with the kind of radio system found in your car or in future in-home communication.
Radio transmission in access control systems must satisfy the necessary security standards.

In 2000 a special SRD (short range device) band in the 868 MHz range was made available for this type of application. The advantage of this SRD band is that there is a clear set of rules governing the usage of sub-bands per time unit. This means that a radio device (e.g. router node) that uses a frequency channel in the 868 MHz range is only allowed to transmit for 36 seconds every hour. These rules are set out in the duty cycle regulations.
This pre-empts permanent users and therefore sources of interference with regard to secure radio transmission, such as wireless headsets and amateur radio operators. There are also ranges reserved exclusively for security applications.
Basic information and specifications about the system technology, such as size of components, minimum ranges, battery lifetime etc., provide a sufficiently secure means of transmission for the use of WaveNet in the 868 MHz range. In the US the 915 MHz band is used, and this is also available from SimonsVoss.
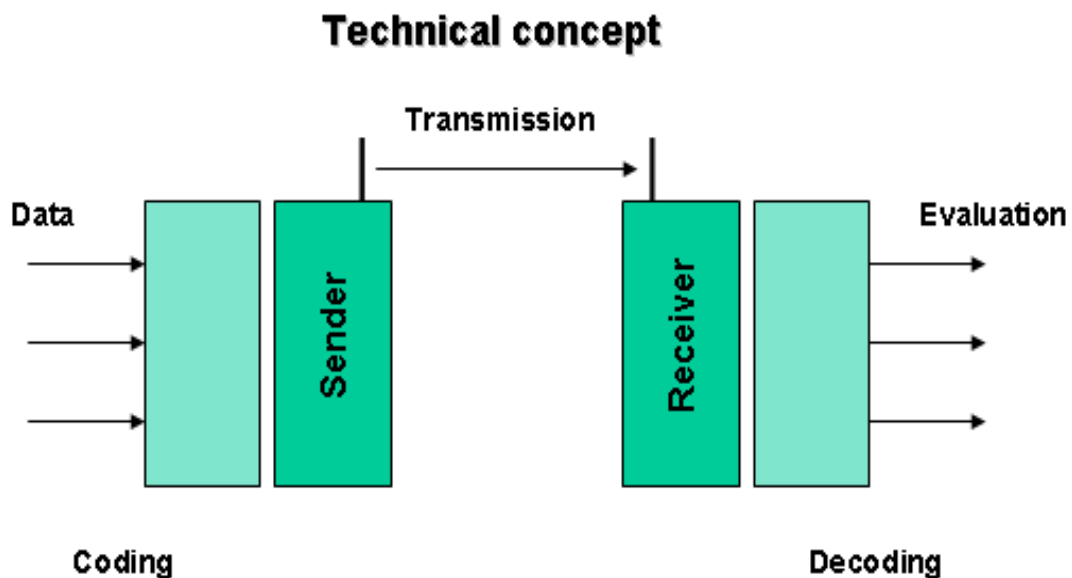
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5.0 WHAT ARE THE BASIC INFLUENCING FACTORS?

Regardless of the transmission procedure, radio transmission is subject to various environmental factors which can disrupt or hinder transmission. Device characteristics can also have an effect on range.

What does range depend on?

- Transmission power
- Antennas
- Sensitivity of receiver
- Environment (air humidity, temperature, external interference)
- Installation site
- Frequency

Structural environment (walls, ceilings etc.)

Transmission range can also be limited by obstacles. The table below provides approximate values:

Material	Energy penetration
Wood, plaster, plasterboard	90-100 %
Brick, chipboard	65-95 %
Reinforced concrete (transmitter on metal)	10-70 %
Metal, metal lattice, aluminium laminate, under floor heating	0-10 %

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6.0   SECURITY OF TRANSMITTED INFORMATION.

The security of information transmitted by radio in WaveNet depends on:

- radio transmission security in relation to data telegram management
- potential sources of interference
- deliberate disruption, i.e. manipulation or sabotage
- intelligent measures taken to avoid interference and find alternative routes

The speed of data transfer / transmission, like the loss of a percentage proportion of information, may also depend on various influencing factors.

These factors may include:

➢ high data traffic within WaveNet
➢ external interference in WaveNet's radio range
➢ power failure in WaveNet's segment areas
➢ transmission failure or disruption in an external network (e.g. LAN)

7.0   WAVENET SYSTEM 3065 NETWORK COMPONENTS.

WaveNet network components essentially have two mutually independent interfaces. This makes it possible to connect two different network segments via the WaveNet network components. **WN.CN.(XX), WN.RN.(XX)**

Definition: Network segments are characterised firstly by a certain transmission medium (e.g. RS485 cable, Ethernet (TCP/IP), USB, RS232 cable, 868 MHz radio, WLAN) and secondly by an individual input and output segment address (GID = Group ID → slave or master address)
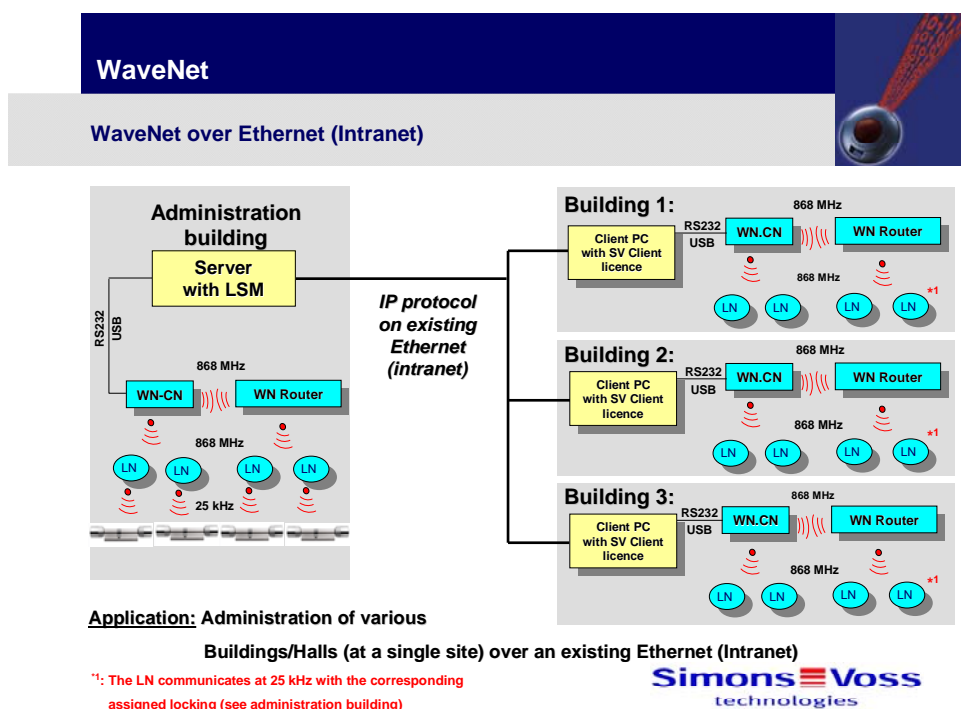
The following SimonsVoss WaveNet network components are available:

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7.1 PCs

PCs can be integrated into WaveNet using special communication node software (CommNode):

- between the user interface and RS232 interface or
- between the user interface and TCP/IP (Internet, Intranet) or
- between the user interface and USB interface

Application: Administration of various

Buildings/Halls (at a single site) over an existing Ethernet (Intranet)

*1: The LN communicates at 25 kHz with the corresponding assigned locking (see administration building)

7.2 Router nodes (general)

WaveNet router nodes connect two different network segments which use either the same transmission medium (e.g. RS485-RS485) or different transmission media (e.g. RS485 cable/radio 868 MHz, Ethernet/RS485 or radio 868 MHz, WLAN/RS485 or radio 868MHz).
The WaveNet router node also filters the data flows from the segments so that the only data forwarded to the segment downstream of the WaveNet router node is the data to be processed in this same segment. All other data is blocked from the downstream segment by the WaveNet router node.
At present, WaveNet router nodes can connect the following transmission interfaces between segments: RS485 CAT 5 cable, Ethernet TCP/IP, USB, RS232 cable, radio 868 MHz, WLAN.

Do not install RouterNodes with a radio or WLAN interface directly on metal or reinforced concrete! Maintain a gap of approx. 30 cm.

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7.3   Router nodes (special variants)

WaveNet central nodes are router nodes that can interconnect
- between PC (RS232 interface) and radio 868 MHz or
- between PC (RS232 interface) and CAT 5 cabling (RS485) or
- between PC (USB interface) and radio 868 MHz or
- between PC (USB interface) and CAT 5 cabling (RS485).

WaveNet router nodes interconnect
- between Ethernet (TCP/IP) and radio 868 MHz or
- between Ethernet (TCP/IP) and CAT 5 cabling (RS485) or
- between WLAN and radio 868 MHz or
- between WLAN and CAT 5 cabling (RS485)

7.4   Repeater nodes

WaveNet repeater nodes are repeaters that can be used within <u>one</u> segment to extend the range (wiring length). In other words, if the cable laid in the network exceeds the specified length (up to 900 m), it can be extended using the WaveNet repeater node **(WN.RP.CC)** in accordance with the system specifications.
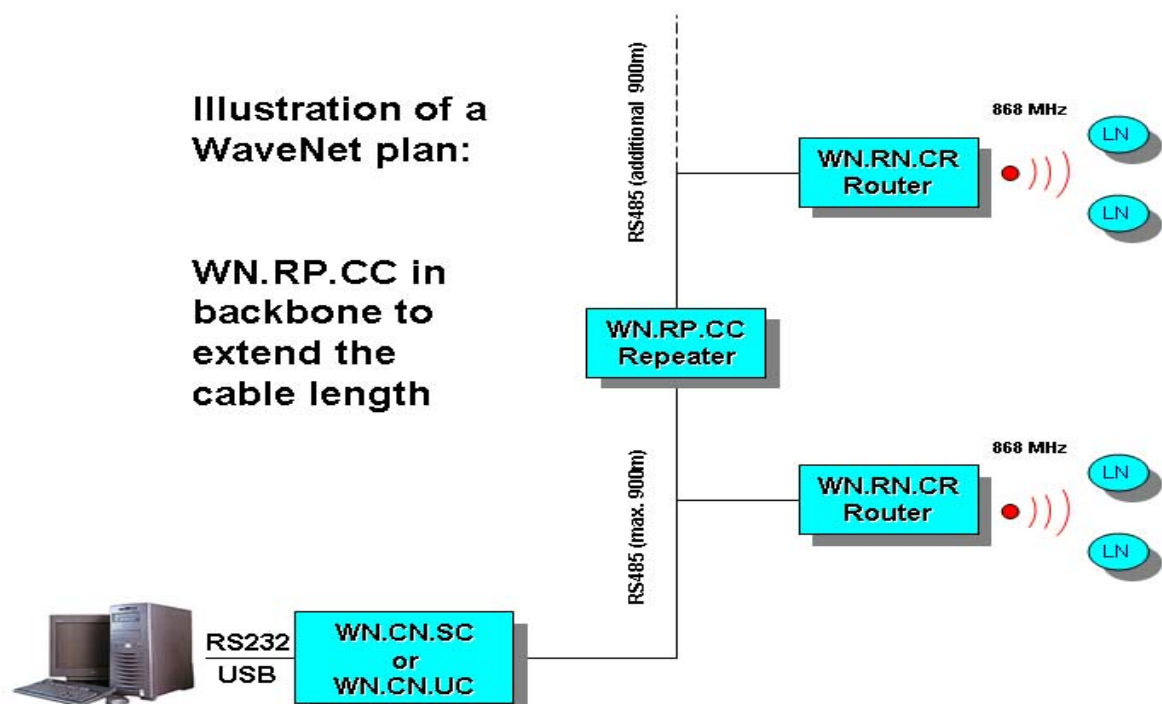
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7.5   Router nodes

WaveNet router nodes as converters from radio (868 MHz) to cable (RS485) or from cable to radio. **WN.RN.RC** or **WN.RN.CR**

- The user is free to select the transmission medium depending on the building structure / installation situation

WN.RN.CR mit
WN.RN.R
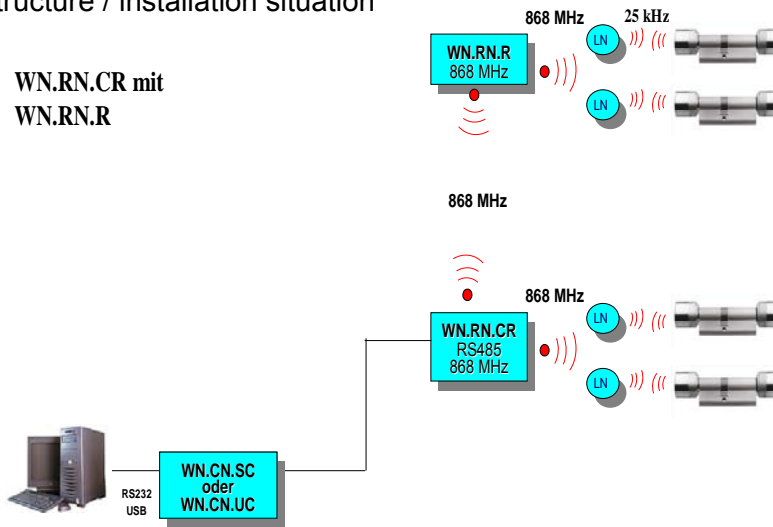
WaveNet router nodes can be used

- If you require a radio range to a LockNode that exceeds the radio range of the WaveNet router node (the radio signal is sent from one WaveNet router node (868 MHz) to another WaveNet router node and then to the LockNode (LN)). **WN.RN.R**
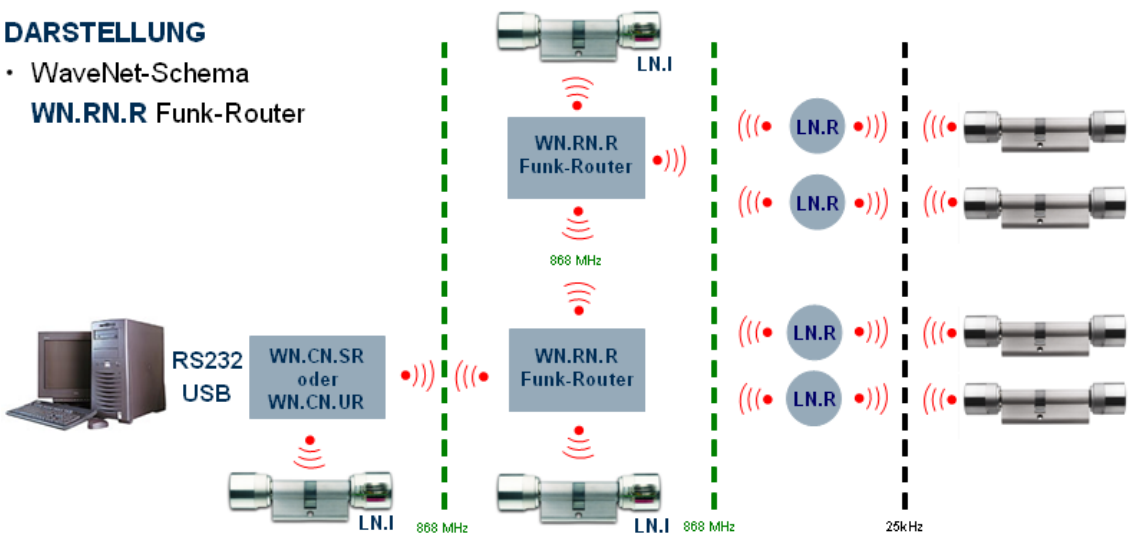
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WaveNet router nodes can be used

- If there is a computer network (LAN) or Internet/Intranet installed at the customer's premises. Any transmission media may be selected. **WN.RN.E(X)**
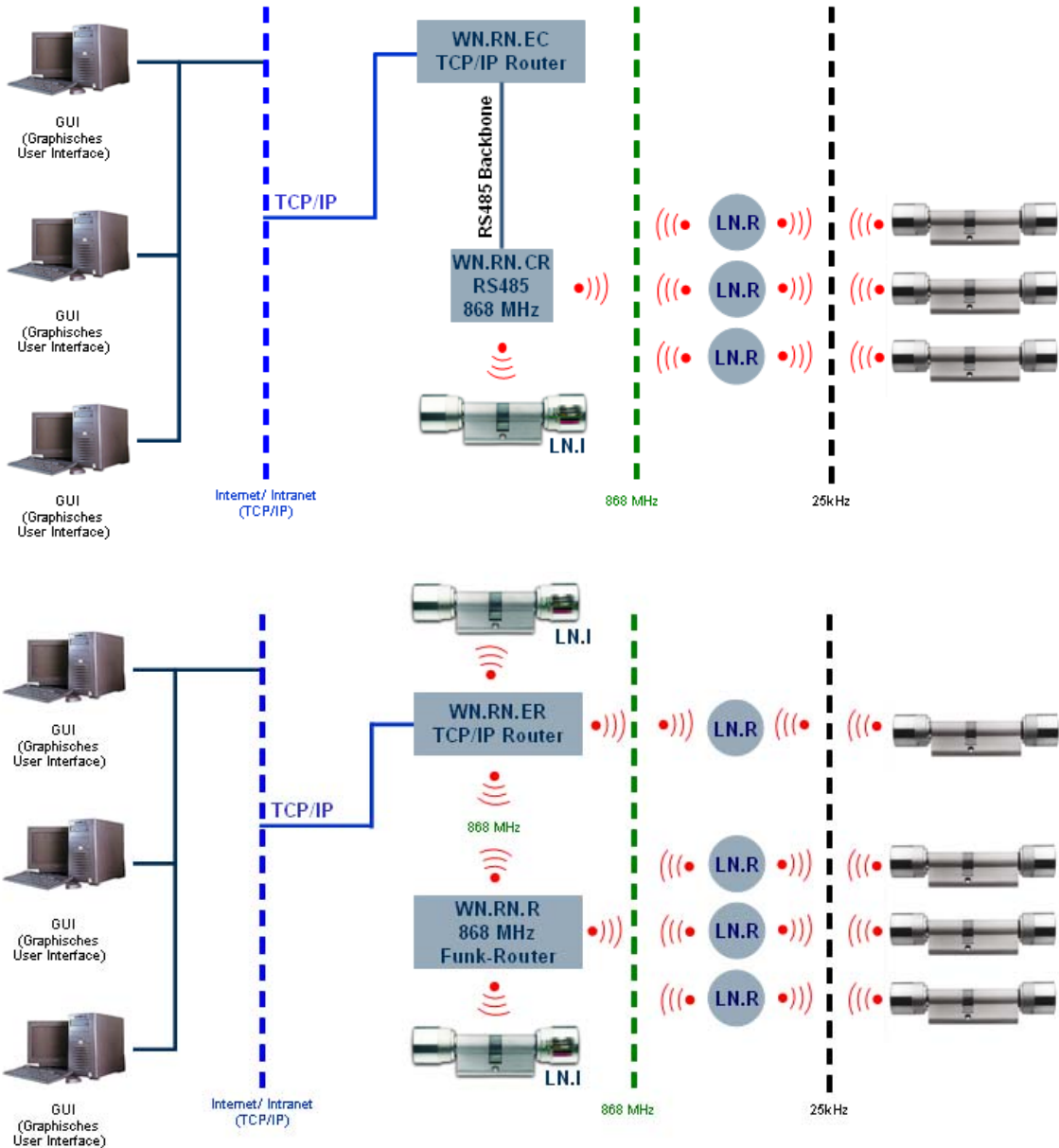
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7.6   Central nodes

WaveNet central nodes can be used

- If there is a computer network (LAN) or Internet/Intranet installed at the customer's premises. Any transmission media may be selected. The central nodes **WN.CN.S(X)** or **WN.CN.U(X)** are connected to the PC. Communication node software (CommNode) is installed on this PC. This allows the central node to be addressed from any location (GUI = Graphic User Interface) in the network. A central node can of course also be connected 'locally' to a PC.
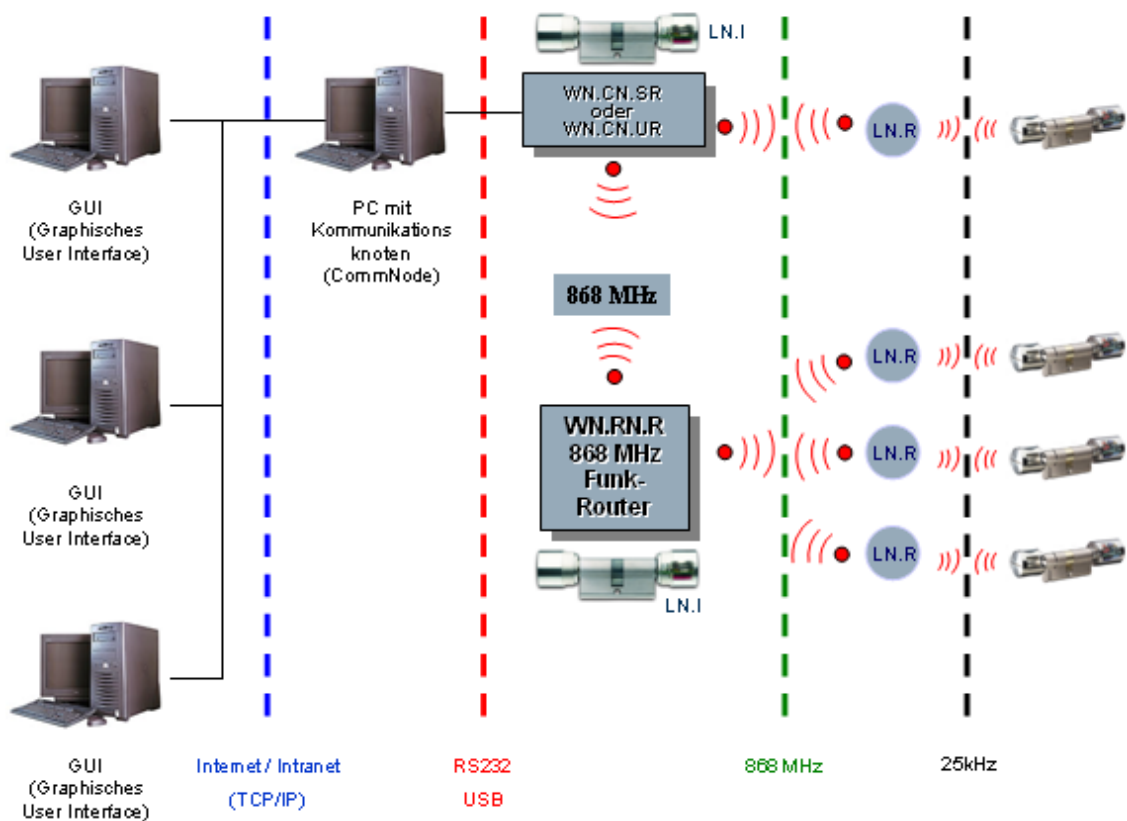
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7.7   LockNode with RS485 interface

WaveNet LockNodes with integrated RS485 interface allow you to create a 'wired' WaveNet. For the cable type, select CAT 5 or higher. As a connection is provided for an external power supply (max. 24 V DC), the LockNodes are not battery-operated (see 7.9). Up to 250 LockNodes can be administered in each segment. To expand a segment you always need a **WN.RN.CC**. The maximum cable length per segment is 900 m. If the cable length is exceeded, you will need a **WN.RP.CC**. This high-speed repeater serves to forward signals in both directions (up/down link). The repeater does not expand the segment.
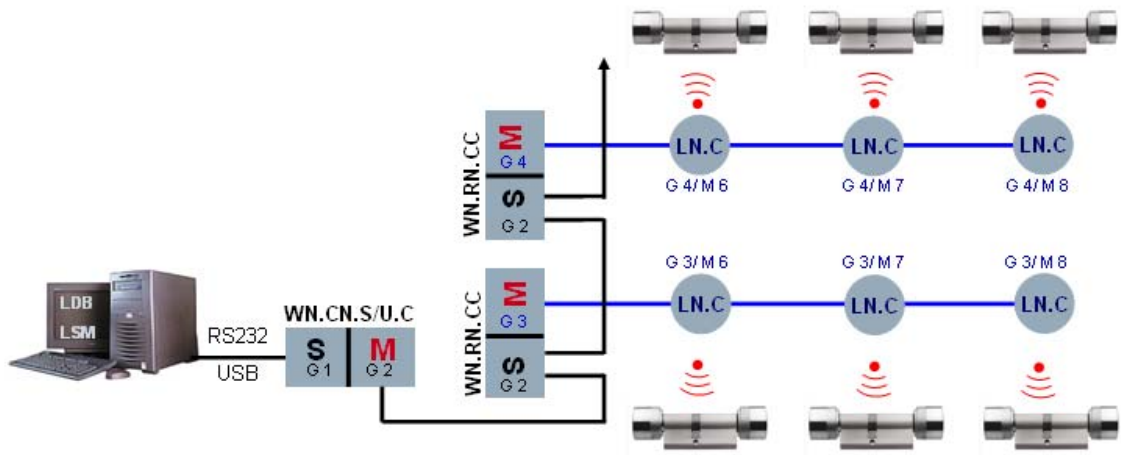
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7.8   Backbone cabling for router / repeater node

An RS485 segment (backbone) is wired up using a bus line in the form of a screened standard CAT 5 cable. The bus line consists of two data lines (Data+, Data-) and a ground line (screening).

This bus line is connected to each RS485 module in the WaveNet router for this segment. The RS485 modules are in contact with the bus line via a green and orange 8-pin Phoenix connector, as shown below:
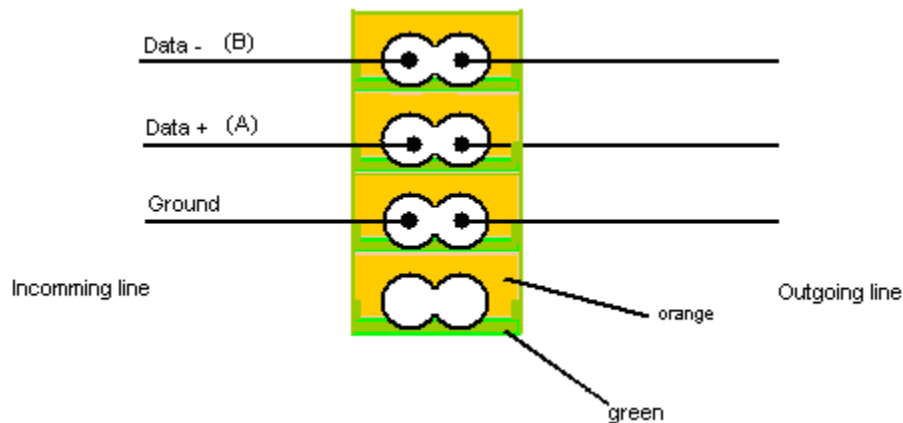
7.9   Connection specification for wired LockNode (WN.LN.C)
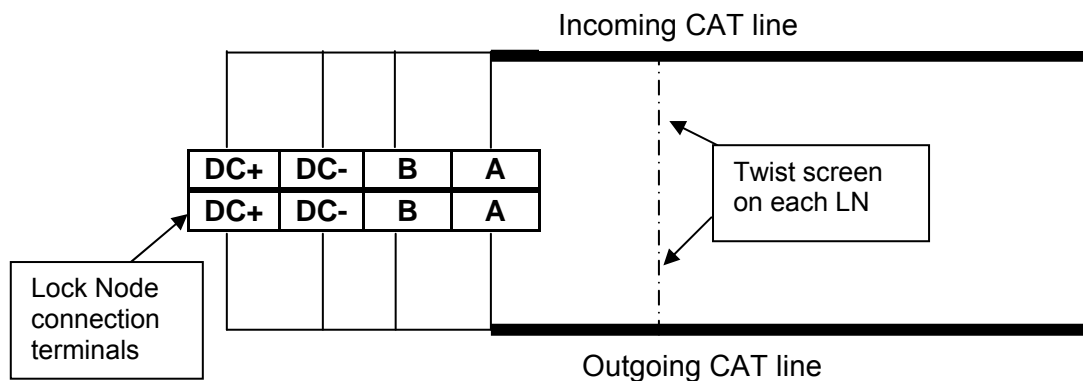
DC: Connection to 6-24V DC power supply, polarity-dependent!
Power consumption of LockNode: 15 mA

A: Connection to data line D+, polarity-dependent!
B: Connection to data line D -, polarity-dependent!

Screening: On each LockNode / router node the screening must be connected through, insulated and in contact with <u>one</u> ground potential (PE)!!!

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7.10 LockNodes

Lock Node
with housing
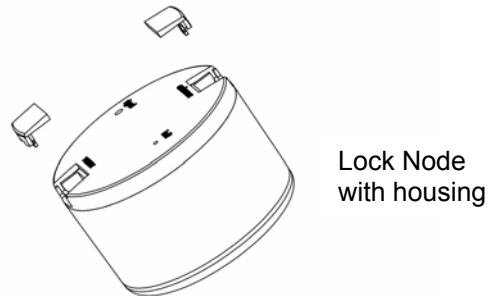
WaveNet LockNodes represent the interface between WaveNet and the locks in the digital locking and organisation system 3060 (e.g. locking cylinders, Smart Relays etc.).

They always have:

- a special B-field interface which enables communication with SimonsVoss locks (e.g. locking cylinders, control units/Smart Relays, furniture locks, etc.)
- a radio interface (868 MHz) to ensure data transmission to the WaveNet nodes (e.g. WaveNet router nodes, WaveNet repeater nodes or WaveNet central nodes) or
- an RS485 interface and connection for an external power supply, for operation in a 'wired WaveNet' **(WN.LN.C)**

WaveNet LockNodes can always be assigned to just one digital lock in the system (e.g. a locking cylinder, Smart Relay or furniture lock, etc.). The distance between the WaveNet LockNode and a digital cylinder / furniture lock must be no more than 30 cm. A minimum distance of 40 cm must be maintained between the LockNode and a Smart Relay. We recommend fitting a cable connection between both components with **WN.KAB.WIRED-BF**. In this scenario, no minimum gap needs to be observed (with SREL.ADV only).

In a radio network, WaveNet LockNodes are **battery-operated** and can therefore be integrated in the SimonsVoss WaveNet with no wiring whatsoever. This makes the system ideal for later installation in an existing building.

The wired variant of the LockNode **(WN.LN.C)** features connections for the RS485 bus and for the external power supply.
(see 7.9).

To simplify installation as far as possible, the housing of the WaveNet LockNode is designed to be installed in a standard built-in mounting box (60 mm deep, 60 mm in diameter) in accordance with **DIN 49073 Part 1** (e.g. for installation in a light switch panel).

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NOTE

We recommend installing an empty mounting box. This will physically separate the LockNode from the switch unit. A switch unit, e.g. a dimmer or electronic ballast, can have a negative impact on communication between LockNode and lock.

In addition, <u>no</u> switching power supplies must be used (e.g. as a power supply for the LockNodes). Distance between switching power supply and LockNode / router node: ≥ 2 m.
With some switch ranges, less space is available owing to the cover attachment.

LockNode inputs / output:

Each WaveNet LockNode also features one output and three inputs, e.g. for door monitoring (except WN.LN.R.O.I/O und WN.LN.I)

The three inputs allow up to three external potential-free contacts to be connected. This allows for the central monitoring of door or bolt contacts, for example, but also motion sensors, light barriers etc., over the WaveNet network.

The statuses of connected contacts can be interrogated (polled) from the central computer at any time. Modifications to the contacts (events) can also be reported automatically to the central computer if the LockNode is configured accordingly.

The output forwards signals to external systems such as signal transmitters, heating, lighting etc. The output takes the form of an electronic switch (open drain) that can switch up to 25 V and up to 650 mA.

For the optional **activation of I/Os** there is a 6-pin colour-coded cable **(WN.LN.SENSOR.CABLE)** which is connected to the socket labelled 'sensor' on the LockNode. For monitoring tasks, up to three potential-free contacts can be connected between the green 'in common' line and each of the coloured (pink, grey, yellow) lines (see diagram).
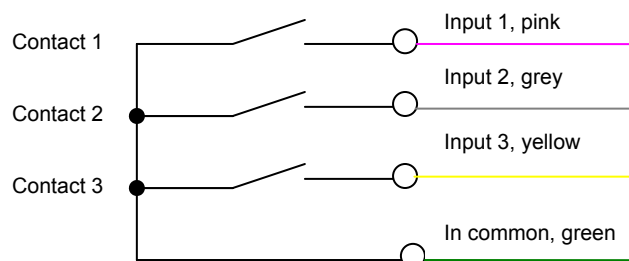
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In the LDB or LSM user interface, an open contact has a value of 0 and a closed contact has a value of 1. In the diagram above, for example, if contact 1 is used to monitor a door, an opening door will constitute an event: 'Input1 transition from 1 to 0', if contact 1 is closed when the door is closed and open when the door is open.

Internally, the output takes the form of a transistor in open-collector switching. The white and brown cables are available for connecting to external devices (e.g. buzzers). The following applies: Out = brown, ground = white.

Connection example for possible output circuit:
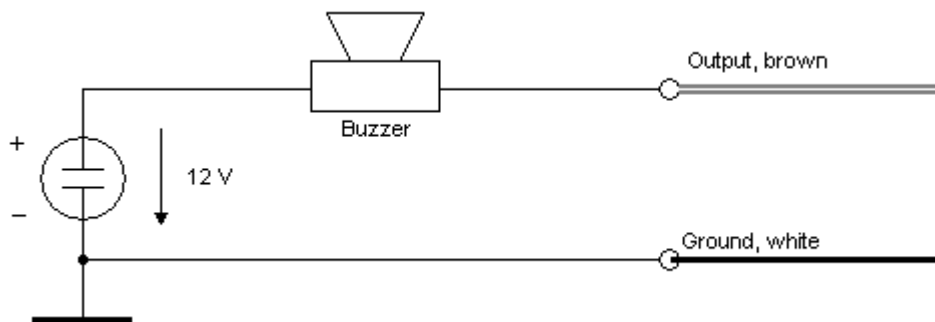
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7.11   Network Inside

Network Inside is also known as direct networking. The required LockNode is located in the base of the cylinder knob on the electronics side. The LockNode electronics are connected to the TN4 electronics by hardware contacts. This enables a network connection to the cylinder without any installation on or near the door. An offline cylinder can be converted to an online version by simply changing the base of the knob.

Order code: WN.LN.I. You can recognise a convertible offline cylinder as follows.
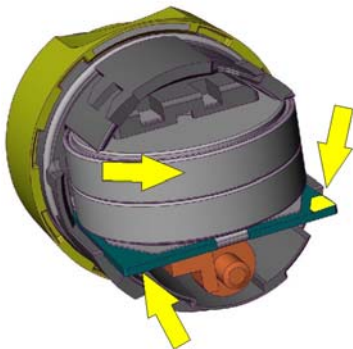
The three yellow arrows on the TN4 electronics indicate the contacts of the WN.LN.I.
The contact surfaces (arrows 2/3) on the TN4 board show where the Network Inside connection would be.
(Cylinders manufactured as of 2008, software version: 10.5.10.53)

You can recognise a cylinder with direct networking by the black ring around the circumference.

The cylinder with Network Inside is integrated in a WaveNet like a WN.LN.R and requires a segment address and member ID.

A distance of up to 30 m from a CentralNode or RouterNode is possible (depending on the building structure). After contact is made with a TN4 cylinder, four short blips sound. The temperature range is between – 15°C (with a remaining battery capacity of 45%) and 50°C.

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7.12   Networking a SmartHandle

Every SmartHandle can be networked with the WN.LN.I.SH.

The LockNode is integrated in the outside of the fitting within the sub-assembly and is thus subsequently not visible. (This is also possible at a later date.) The inlay with the SimonsVoss logo serves as antenna.

Installation: Please refer to the SmartHandle manual for instructions on how to remove the inlay and guard. Avoid all direct contact with components on the board. Before installation, please ensure that there is no electrostatic charge, e.g. through contact with the heating system.

The WN.LN.I.SH (board) is inserted into the slot intended for this purpose at an angle of approx. 15° to the sub-assembly of the outside fitting → metal clip. The metal clip ensures that the part sits firmly on the fitting and constitutes the positive terminal. When the board is inserted correctly it will lie flat on the sub-assembly. The spring-loaded tip will later form the contact to the inlay (with the SimonsVoss logo). The inlay serves as the antenna. Before the guards are replaced, the contact cable from the WN.LN.I.SH must be connected to the electronics in the fitting using the 2-pin plug. Place excess cable length in the sub-assembly. Please ensure that the connector cable is not damaged and that the guard covers can be easily replaced.

Technical values the same as for WN.LN.I.

Sub-assembly outside

WN.LN.I.SH

Connector lead with connector
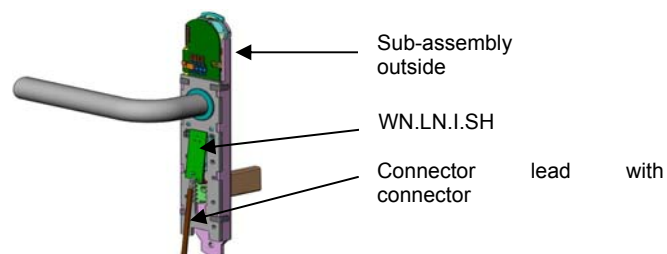
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7.13 Networking a SmartRelais G2

The SmartRelais G2.W can be networked with a WN.LN.I.SREL.G2.

The LockNode is also slotted onto the board of the SmartRelais G2. (This is also possible at a later date.) A plug connector is located below the horizontally aligned antenna of the SmartRelais. This must be connected to the housing part of WN.LN.I.SREL.G2. To do this, align the housing part with the form of the SmartRelais board. The two boards can now be connected with each other by pressing them together carefully. Avoid all direct contact with components on the board. Before installation, please ensure that there is no electrostatic charge, e.g. through contact with the heating system. The power for the LockNode is supplied by the SmartRelais G2 or by the power supply unit connected. Do not use a switched power supply unit. Battery operation with SREL.BAT is not permitted. Technical values the same as for WN.LN.I.

Connector to connect SREL and LockNode

WN.LN.I.SREL.G2 with part of housing
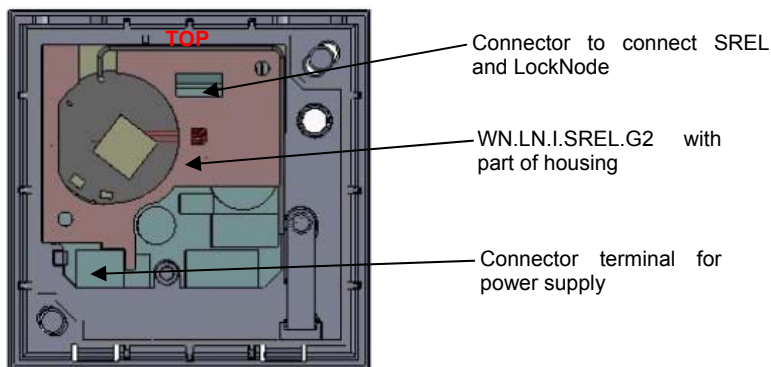
Connector terminal for power supply

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7.14 Networking the SmartRelay 2 G2

The SmartRelay 2 G2.W can be networked with a WN.LN.I.SREL2.G2.

The LockNode is slotted onto the board of the SmartRelay G2. (This is also possible at a later date.)

Slot on SREL2 for WN(M).LN.I.SREL2.G2

Position for the spacer plate between LockNode and SREL2 board

LockNode WN(M).LN.I.SREL2.G2

Remove the protective film from the adhesive side of the spacer plate. Insert the WN(M).LN.I.SREL2.G2 into the groove intended for this purpose on the spacer plate. With the power supply disconnected (SREL2), insert the WN(M).LN.I.SREL2.G2 into the slot on the SREL2 and press the adhesive surface of the spacer plate onto the SREL2 board. When the power supply is reconnected, four short blinking signals will indicate that the LockNode is operational. The lock can now be operated online. Avoid electromagnetic interference fields, other frequencies in the 868 MHz range or e.g. frequency converters in the immediate proximity of the SREL2 / LockNode.

Avoid all direct contact with components on the board. Before installation, please ensure that there is no electrostatic charge, e.g. through contact with the heating system. The power for the LockNode is supplied by the SmartRelay G2 or by the power supply unit connected. Do not use a switched power supply unit. Battery operation with SREL.BAT is not permitted. Technical values the same as for WN.LN.I.
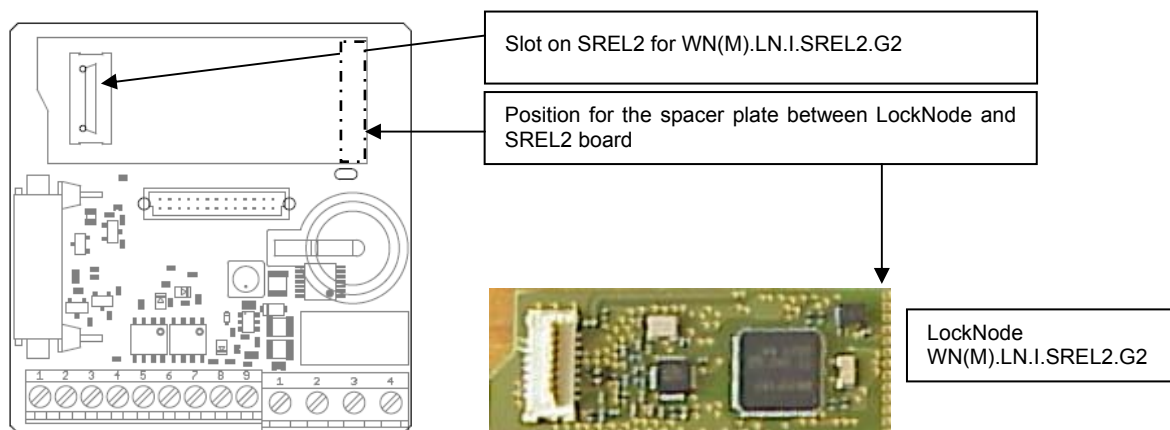
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7.15 Networking the CompactReader

It is <u>not</u> possible to network a CompactReader at a later date. The LockNode is located inside the housing of the CompactReader. If the CompactReader is to be operated in a network, this must be indicated when ordering.
Order code: TRA.CR.MIFARE.WN(M), TRA.CR.MIFARE.W.WN(M), also available as a WP version.

7.16 Networking with Smart Card Cylinder .MP using WN(M).LN.I.MP
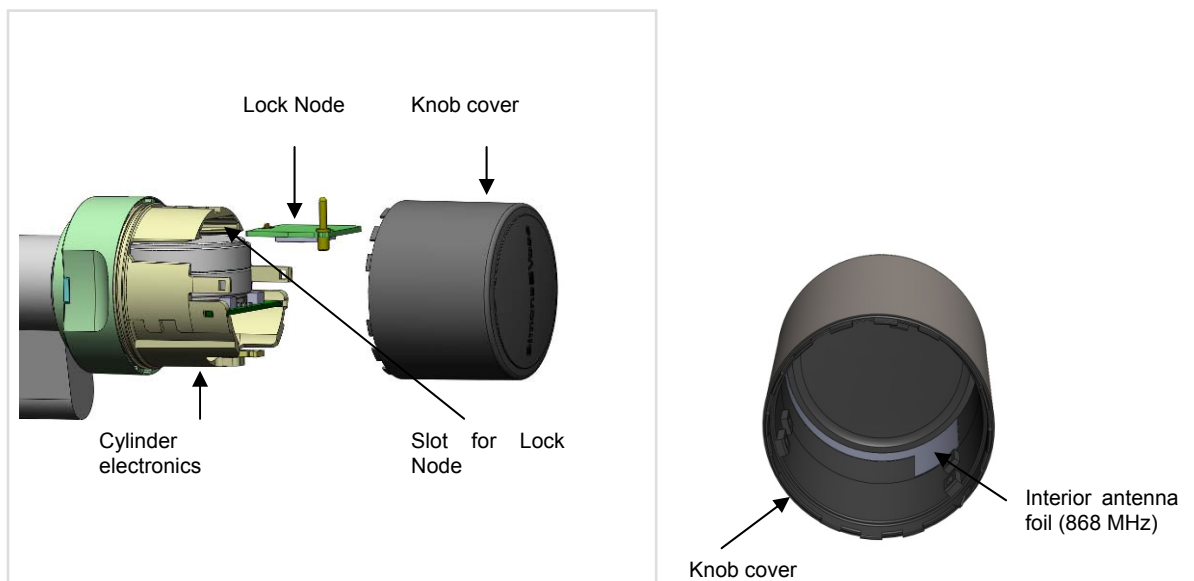
The latest Lock Node generation WN(M).LN.I.MP can be used to retrofit networking capability in the new Smart Cylinder .MP. To do so, the Lock Node is inserted into the slot above the batteries while the spring-loaded antenna pin is connected to the antenna foil in the knob cover interior.

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All Smart Card .MP Cylinders can be retrofit with networking capability.
- Conventional: hex address programmed in Production → WN.LN.I.MP
- WN-Manager 2.4: WNM.LN.I.MP (auto-configuration)
- LSM 3.2 and higher
- Packing unit: Lock Node circuit board <u>with</u> knob cover + integrated antenna foil

Technical specifications

Technical specifications	
Lock Node	Circuit board with antenna pin
Dimensions	Approx. 16 x 16 mm + antenna pin
Power supply	3 V from cylinder battery
Lock Node transmitting capacity	Max. 10 dBm (6.3mW) to the antenna socket
Transmission frequency	868-870 MHz

Product versions

Description	Order code	G2
WaveNet Lock Node circuit board and knob cover with antenna foil to retrofit direct networking (conventional)	WN.LN.I.MP	Yes
WaveNet Lock Node circuit board and knob cover with antenna foil to retrofit direct networking with auto-configuration	WNM.LN.I.MP	Yes

Installation and configuration

Follow the procedure below to fit the WN(M).LN.I.MP:

- First remove the knob cover on the electronics side of the locking cylinder.
- You then need to release the card reader or the antenna bracket from its mount. Carefully press the battery holder together where you see three small arrows, so that the antenna bracket disengages. Carefully fold the antenna bracket out; do not apply any mechanical force.
- Carefully slide the Lock Node halfway into its designated slot above the inserted batteries. The spring-loaded antenna pin **must** be pointing upwards towards the knob cover.
- Now re-attach the card reader/antenna bracket, replace the knob cover with the integrated antenna foil and re-lock.
- The .MP Cylinder is now directly networked. **Also** read the operating instructions for the Smart Card .MP Cylinder.

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Note: the knob cover on offline .MP Cylinders **does not** feature an inserted antenna foil for an 868 MHz wireless network. It is therefore **essential** to replace the knob cover.

Antenna pin

WN(M).LN.I.MP

Contact spring

Slot for WNM.LN.I.MP

Correctly fitted Lock Node

Inserted correctly
Lock Node with card reader/antenna bracket
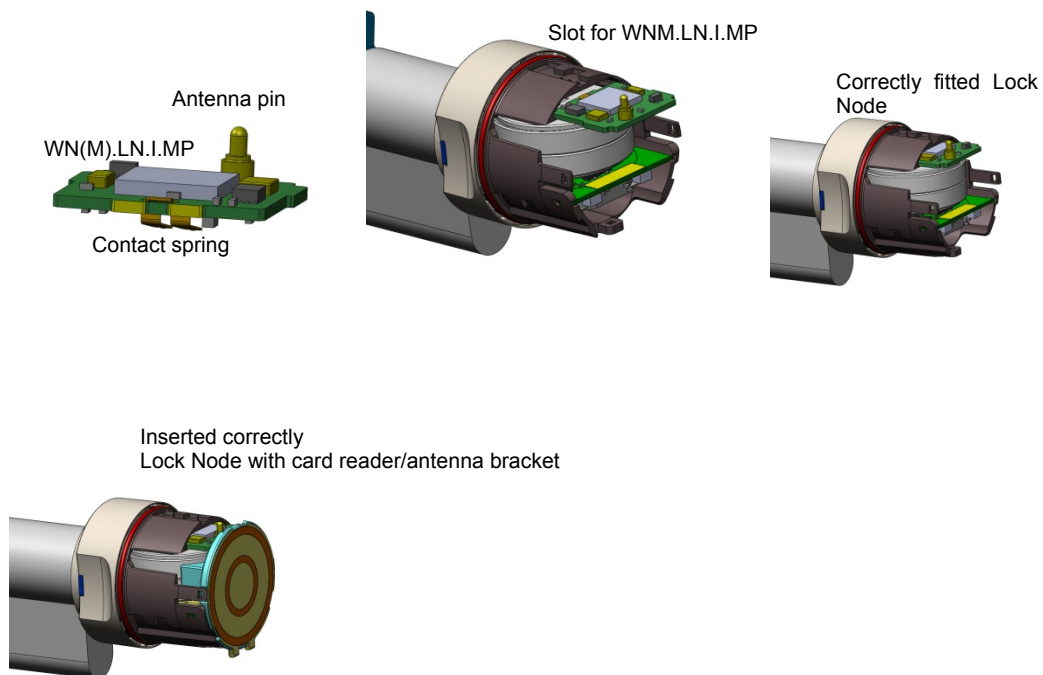
8.0   WAVENET MANAGER.

The WaveNet Manager allows all network nodes (CentralNodes, RouterNodes and LockNodes) in a SimonsVoss wireless/cable network to be automatically addressed (hexadecimal address).
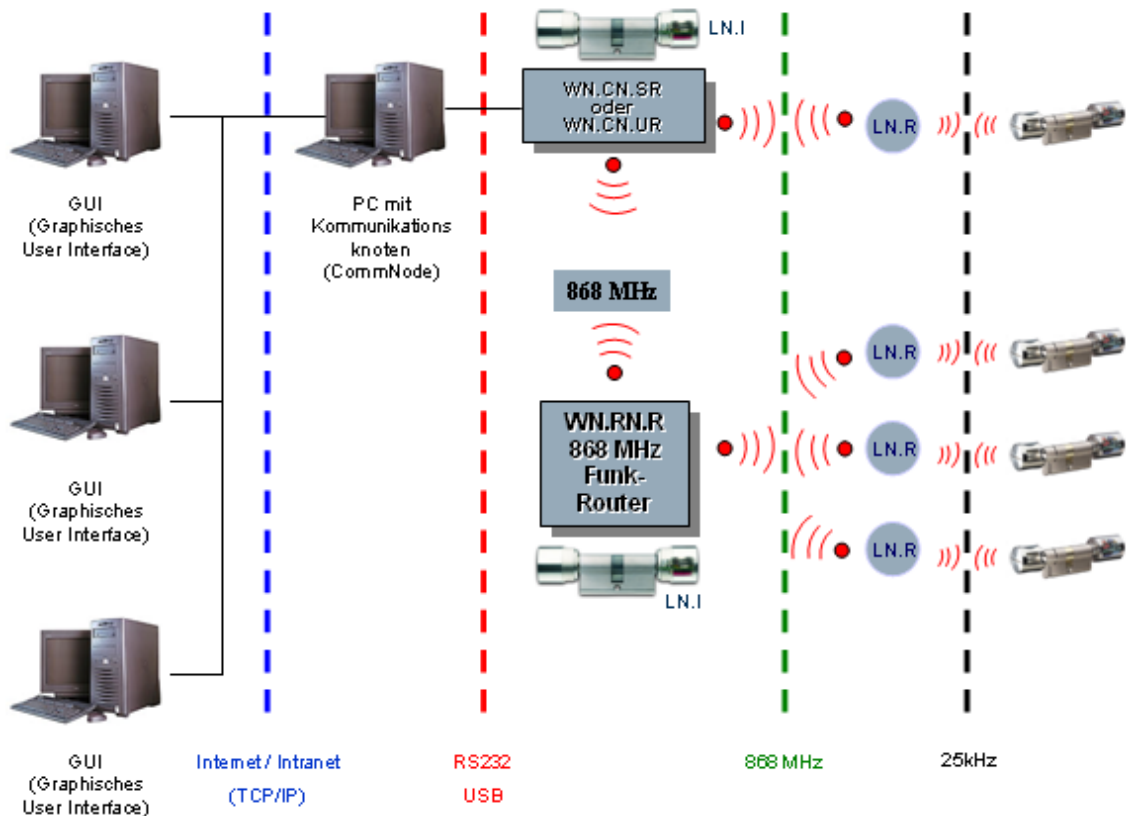All products whose order code starts with WNM.XX.YY are suitable for automatic configuration. Please refer to the WaveNet Manager manual for further information.
URL: http://www.simons-voss.de/Downloads

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9.0   NETWORK STRUCTURE WITH LSM.

The network structure shown above allows different users with individual rights to access a shared server via the Internet / Intranet using the SimonsVoss WaveNet communication node software (CommNode) and the GUI (Graphic User Interface). This server functions as a communication node and is connected to the WaveNet central node by an RS232 cable or a USB cable.

In the example above, the WaveNet central node connected to the server communicates directly by radio (868 MHz) with a LockNode, which in turn exchanges data by radio (25 kHz) with the digital components (locking cylinders).
In the example shown above, all other LockNodes are outside the radio range of the WaveNet central node and are therefore addressed indirectly through a WaveNet router node.

The above structure can be configured elegantly with the multi-user, multi-client, database-based LSM locking system administration software from SimonsVoss. However, the above example only includes one comm node and therefore only one central node with a local sub-network. In reality, virtually any number of comm nodes can be distributed in the Intranet or Internet. For example, you can set up a 'branch system' whereby you can address any number of branches with local central nodes and associated sub-networks over the Intranet / Internet from a central point.

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In the LSM, virtually any number of WaveNet Ethernet routers **WN.RN.E(X)** or WaveNet WLAN (<u>W</u>ireless <u>L</u>ocal <u>A</u>rea <u>N</u>etwork) routers **WN.RN.W(X)** can be integrated in a customer computer network (LAN or WLAN). There is no need to install a backbone (RS485 bus cabling), but it is possible in locations without Ethernet/WLAN.

The **WN.RN.E(X)** is PoE-capable (Power over Ethernet). If you are using PoE so you will need a midspan power supply such as *Phihong PSA 16 U.*
Alternatively, **WN.RN.E(X)** and all **WN.RN.(XX)** configurations can be operated with a plug-in power supply. → WN.POWER.SUPPLY.PPP (not included in delivery).

The file-based LDB locking system administration software from SimonsVoss (which is much simpler to install and easier to operate) also enables direct integration of the transmission medium into the Intranet / Internet. To do this, a WaveNet router node is connected to the customer's LAN and configured using LDB or additional software (Digi Connect) (see manual for WN.RN.E(X)). A maximum of <u>four</u> WaveNet routers can be administered in one LDB, but only <u>one</u> can be activated. → Applies to **WN.RN.E(X)** and **WN.RN.W(X)**

Networks are divided into segments. One WaveNet central node can operate up to 252 segments, and each segment can have up to 250 WaveNet LockNodes / WaveNet router nodes.

Note: If you are working with the LSM software, you can also have a distribution of 2030/30 and 250/250 (segments / LockNodes per segment). During the project planning phase you can decide whether you need more segments or more LockNodes per segment.

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10.0 SECURITY.

Since WaveNet records and logs critical data, it must be reliably protected against unauthorised access. This demands high standards of the system in terms of information security and manipulation security.

10.1 Secure communication between WaveNet nodes

Network communication is protected against eavesdropping and data monitoring by sophisticated cryptography.

10.2 Automatic checking of individual system components

Because the individual components can be installed over large areas of a building, the system must automatically recognise malfunctions, manipulations and the opening of a door and report them to the controlling PC.

Important: If you want a door to be fitted with door monitoring it must be equipped with at least a door contact that recognises the opening status.

10.3 Alarms

Alarms are messages requiring an immediate response (e.g. break-in, fire). WaveNet is not intended to replace fire or intruder alarm systems!

11.0 BATTERY WARNING.

Communication problems may arise between a Lock Node and its associated lock as well as between the Loc Node and a RouterNode (WaveNet RouterNode, WaveNet CentralNode) if the voltage of the batteries used in the LockNode and required for supplying it with power falls below a certain level.

If this type of problem occurs, a corresponding "N" or "W" will be displayed in red following the relevant lock (communications error). If the red "N" or "W" does not turn yellow or blue after re-running the log, a check should be made to see whether the batteries need to be replaced. One of the new batteries should be inserted with reverse polarity for approx. 1 second before the batteries are inserted into the WN.LN.R. This results in a reset, and the battery warning on the LockNode disappears. The two batteries can then be inserted with the correct polarity.

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12.0 NETWORK 'N' / 'W'.

In the LDB/LSM, locks/doors are labelled with an 'N' / 'W' if they are fitted with a LockNode. 'N's' / 'W's' are shown in the following colours to differentiate between statuses.

Red 'N'/'W':   No connection to LockNode.
Yellow 'N'/'W':   Connection to LockNode but <u>not</u> to lock (door may be open)
Blue 'N'/'W':   Connection to LockNode <u>and</u> to lock

13.0 REPLACING LOCKNODE BATTERIES.
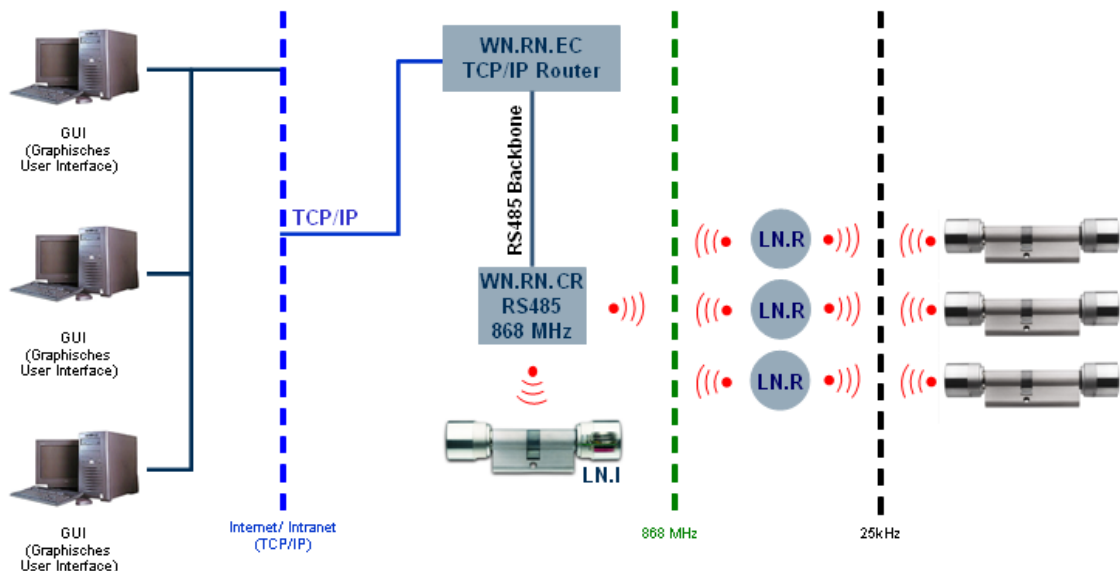
To replace the batteries in the LockNode, you need to remove the LockNode from its installation position (e.g. built-in mounting box) and unscrew the cover on the back.

The position of the two batteries is clearly labelled in the battery compartment. Only use batteries which have been approved by SimonsVoss.

When inserting the new batteries, please observe the LED. Immediately after you insert the <u>first</u> new battery in the empty battery compartment, the LED must flash briefly twice. The node is then ready for operation (power-on reset). If the LED does not light up, please take the battery out again, short-circuit the battery contacts of the LN and re-insert the battery.

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14.0   INSTALLATION OF WAVENET LOCKNODES.

The distance to the locking cylinder must be kept as short as possible. However, a minimum gap of 3 cm from the frame must be maintained.

The max. distance between WaveNet lock node and locking cylinder is 30 cm. The minimum distance is 10 cm.

The WaveNet lock node should be installed at the height of the locking cylinder. (Preferably install in standard built-in mounting box and light frame with cover).

- The radio ranges of RNs and LNs are generally at their maximum when router nodes are fitted with the antenna aligned vertically, pointing upwards (or downwards). The 'Init' button on the LockNode should always point towards the digital cylinder. If the LockNode is installed to the right, next to the cylinder, for example, the SimonsVoss logo will be upside down.

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15.0 DISPLAY OF OPERATING STATUSES AND LED DISPLAYS.

15.1 WN.RN.(XX), WN.LN.C

➢ Power-on reset: 2 x short red flashes
➢ Link quality between two WN.RN.R by activating button on baseboard:

1/2 flashes of signal LED → Transmission and reception power poor
3/4 flashes of signal LED → Transmission and reception power OK
5/6 flashes of signal LED → Transmission and reception optimal

15.2 WN.RN.R, WN.CN.(X)R, WN.RN.ER

➢ If the green LED flashes slowly, listening mode is active or
➢ flashes quickly, communication is present with the LockNode
➢ Red LED off

15.3 Node defect (through self-test)

➢ Continuous red light: Hardware defect

15.4 WN.RN.(X)C, WN.CN.(X)C: Master

➢ Red flicker, green LED off: No segment slave found (cable is defective or no functioning slave)

15.5 WN.RN.C(X), WN.LN.C: Slave

➢ Red flicker, green LED off: No segment master found (cable is defective or no functioning slave)

For 14.4-5: Flickering of both LEDs means everything is OK.

15.6 WN.LN.R

➢ Power-on reset: 2 x short red flashes
➢ Battery status (after power-on reset):
➢ 1 x short red flash → Battery fully charged
➢ 1 x long red flash → Battery critical
➢ 1 x continuously on > 4 seconds → Battery flat

➢ Link quality between WN.(X)N.(X)R and LockNode by activating button on LockNode baseboard:

1/2 flashes of signal LED → Transmission and reception power poor
3/4 flashes of signal LED → Transmission and reception power OK
5/6 flashes of signal LED → Transmission and reception optimal

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15.7 WN.RN.CC

➢ Power-on reset: yellow LED on
➢ Upstream data traffic (towards master): green LED on
➢ Downstream data traffic (from master): dark green LED on

15.8 WN.CN.U(X)

➢ USB correctly recognised and power-on reset: yellow LED on
➢ If the green LED flashes slowly, listening mode is active or
➢ flashes quickly, communication is present with the LockNode
➢ Red LED off

15.9 WN.RP.CC

➢ Voltage present: yellow LED on
➢ Upstream data traffic: green LED on
➢ Downstream data traffic: dark green LED on

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16.0 TECHNICAL DATA.

16.1 WaveNet plug-in power supplies

| Order number	WN.POWER.SUPPLY.PPP
Description	Externally regulated 230V AC / 9V DC / 250 mA Plug-in power supply for WaveNet central node, WaveNet repeater node & WaveNet router node (PPP = Plug Power Pack)

Order number	WN.POWER.SUPPLY.LNC
Description	Externally regulated 230V AC / 24V DC / 1.25A Plug-in power supply only for WN.LN.C, WN.RP.CC, WN.RN.E(X) and WN.RN.W(X) with various network adapters for UK/US/AU

16.2 WaveNet central node, RS232 connecting cable

Order number	WN.CN.RS232.Cable
Description	RS232 connecting cable between PC and WaveNet central node
Length	2 m

Note: Versions of the housing shown as of 15.3 may vary from the original!

16.3 WaveNet central node, RS232 / RS 485 interface
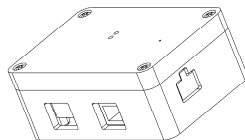
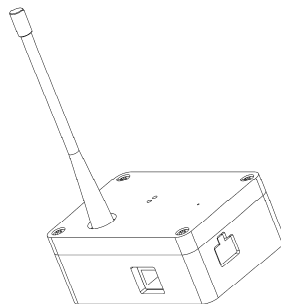| Order number	WN.CN.SC
Description	WaveNet central node for connecting to a PC/server. Central node with integrated RS485 interface for backbone
Dimensions (L*W*H)	100x65x40 mm (applies to all routers without antenna)
Power supply	9V ... 12 V DC regulated plug-in power supply
Output (for all routers)	Min. 3 VA (250 mA with continuous load*) * - Peak current with termination of both ends in backbone

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16.4   WaveNet central node, USB / RS485 interface
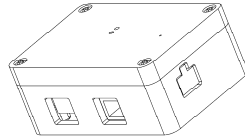
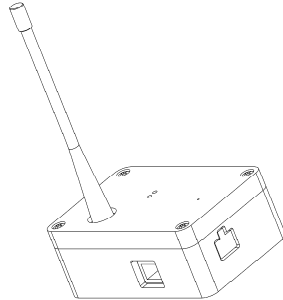| Order number	WN.CN.UC
Description	WaveNet central node for connecting to a PC/server. Central node with integrated RS485 interface for backbone
Dimensions (L*W*H)	100x65x40 mm (applies to all routers without antenna)
Power supply	From USB port
Output	Min. 3 VA (250 mA with continuous load*) * - Peak current with termination of both ends in backbone

16.5   WaveNet central node, RS232 / 868 MHz interface

Order number	WN.CN.SR
Description	WaveNet central node with 868 MHz radio interface and external antenna
Dimensions (L*W*H)	100 x 65 x 40 mm or 100 x 65 x 130 mm (with antenna)
Power supply	9V ... 12 V DC regulated plug-in power supply
Output	Min. 3 VA (250 mA with continuous load)
For all routers with radio module:	
Maximum transmission power	5 dBm (3.16 mW) at antenna socket
Sensitivity	-90 dBm at 19.2 kBaud
Frequency band	868 MHz
Power consumption in receiver mode	12 mA at 9 V

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16.6   WaveNet central node, USB / 868 MHz interface

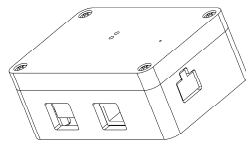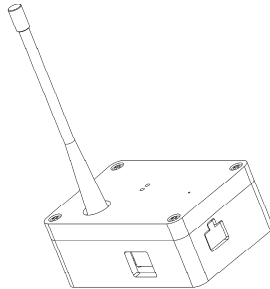| Order number	WN.CN.UR
Description	WaveNet central node with 868 MHz radio interface and external antenna
Dimensions (L*W*H)	100 x 65 x 40 mm or 100 x 65 x 130 mm (with antenna)
Power supply	From USB port
Output	Min. 3 VA (250 mA with continuous load)
For all routers with radio module:	
Maximum transmission power	5 dBm (3.16 mW) at antenna socket
Sensitivity	-90 dBm at 19.2 kBaud
Frequency band	868 MHz
Power consumption in receiver mode	12 mA at 9 V

16.7   WaveNet router node for segment expansion RS485

Order number	WN.RN.CC
Description	WaveNet router node as RS485 router with two RS485 interfaces for segment expansion incl. connecting terminal for external plug-in power supply
Dimensions (L*W*H)	100 x 65 x 40 mm
Power supply	9V ... 12 V DC regulated plug-in power supply
Output (for all routers)	Min. 3 VA (250 mA with continuous load*) * - Peak current with termination of both ends in backbone

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16.8 WaveNet router node 868 MHz

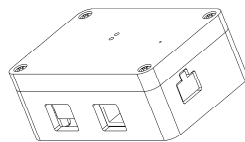| Order number	WN.RN.R
Description	WaveNet router node with 868 MHz radio module. Incl. connecting terminals for external plug-in power supply and external transmission and receiver antenna
Dimensions (L*W*H)	100 x 65 x 40 mm or 100 x 65 x 130 mm (with antenna)
Frequency band	868 MHz
Power supply	9V ... 12 V DC regulated plug-in power supply
Output (for all routers)	Min. 3 VA (250 mA with continuous load*) * - Peak current with termination of both ends in backbone

16.9 WaveNet repeater

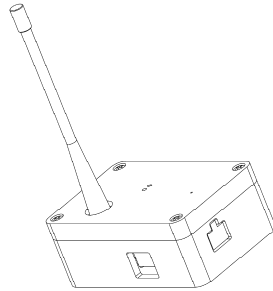| Order number	WN.RP.CC
Description	WaveNet RS485 repeater with two RS485 interfaces to extend line length incl. connecting terminal for external plug-in power supply
Dimensions (L*W*H)	100 x 65 x 40 mm
Power supply	9V ... 40 V DC regulated plug-in power supply
Output (for all routers)	Min. 3 VA (250 mA with continuous load*) * - Peak current with termination of both ends in backbone

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16.10   WaveNet router node as RS485/868 MHz converter

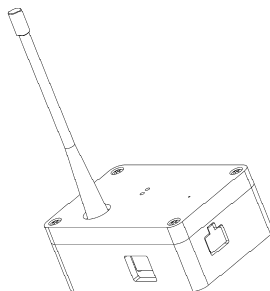| Order number	WN.RN.CR
Description	WaveNet router node as converter between RS 485 interface and 868 MHz interface for using router node as backbone, incl. connecting terminals for external plug-in power supply and external transmission and receiver antenna
Dimensions (L*W*H)	100 x 65 x 40 mm or 100 x 65 x 130 mm (with antenna)
Frequency band	868 MHz
Power supply	9V ... 12 V DC regulated plug-in power supply
Output (for all routers)	Min. 3 VA (250 mA with continuous load*) * - Peak current with termination of both ends in backbone

16.11   WaveNet router node as 868 MHz/RS485 converter

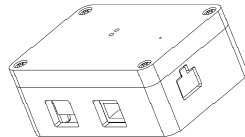| Order number	WN.RN.RC
Description	WaveNet router node as converter between 868 MHz and RS 485 interface for using router node as backbone, incl. connecting terminals for external plug-in power supply and external transmission and receiver antenna
Dimensions (L*W*H)	100 x 65 x 40 mm or 100 x 65 x 130 mm (with antenna)
Power supply	9V ... 12 V DC regulated plug-in power supply
Output (for all routers)	Min. 3 VA (250 mA with continuous load*) * - Peak current with termination of both ends in backbone

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16.12   WaveNet router node as Ethernet/RS485 converter

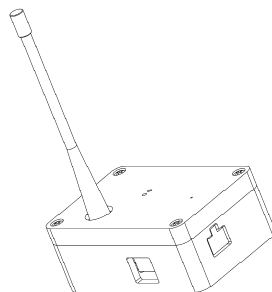| Order number	WN.RN.EC
Description	WaveNet router node as converter between Ethernet interface (TCP/IP) and RS 485 interface for using router node as backbone, incl. connecting terminals for external plug-in power supply
Dimensions (L*W*H)	100 x 65 x 40 mm or 100 x 65 x 130 mm (with antenna)
Frequency band	868 MHz
Power supply	9V ...48 V DC regulated plug-in power supply
Output (for all routers)	Min. 3 VA (250 mA with continuous load*) * - Peak current with termination of both ends in backbone

16.13   WaveNet router node as Ethernet/868 MHz converter

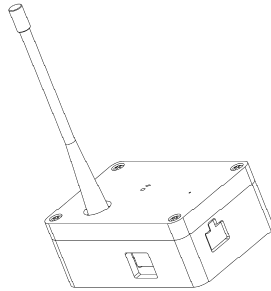| Order number	WN.RN.ER
Description	WaveNet router node as converter between Ethernet interface (TCP/IP) and 868 MHz interface. Incl. connecting terminals for external plug-in power supply and external transmission and receiver antenna
Dimensions (L*W*H)	100 x 65 x 40 mm or 100 x 65 x 130 mm (with antenna)
Frequency band	868 MHz
Power supply	9V ... 48 V DC regulated plug-in power supply
Output (for all routers)	Min. 3 VA (250 mA with continuous load*) * - Peak current with termination of both ends in backbone

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16.14 WaveNet router node as WLAN/RS485 converter

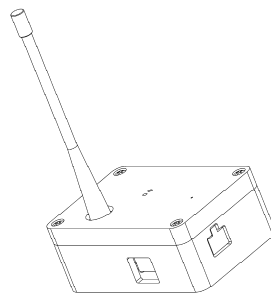| Order number	WN.RN.WC
Description	WaveNet router node as converter between WLAN interface (TCP/IP) and RS 485 interface for using router node as backbone, incl. connecting terminals for external plug-in power supply
Dimensions (L*W*H)	100 x 65 x 40 mm or 100 x 65 x 130 mm (with antenna)
Frequency band	868 MHz
Power supply	9V ... 48V DC regulated plug-in power supply
Output (for all routers)	Min. 3 VA (250 mA with continuous load*) * - Peak current with termination of both ends in backbone

16.15 WaveNet router node as WLAN/868 MHz converter

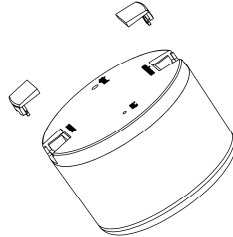| Order number	WN.RN.WR
Description	WaveNet router node as converter between WLAN interface (TCP/IP) and 868 MHz interface. Incl. connecting terminals for external plug-in power supply and external transmission and receiver antenna
Dimensions (L*W*H)	100 x 65 x 40 mm or 100 x 65 x 130 mm (with 2x antenna)
Frequency band	868 MHz
Power supply	9V ... 48 V DC regulated plug-in power supply
Output (for all routers)	Min. 3 VA (250 mA with continuous load*) * - Peak current with termination of both ends in backbone

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16.16 WaveNet LockNode

Order number	WN.LN.R
Description	Battery-operated WaveNet LockNode (Node for PC networking of digital components) with 3 inputs and 1 output
Dimensions (H x ∅)	37 mm x 53 mm
Power supply	2x CR2/3AA batteries, lithium 3.6 V Tadiran, SL761
Power consumption	Radio transmit: 32 mA; radio receive: 18 mA; Power consumption with no data traffic: approx. 20 µA Note: depends on data traffic and HF interference density
Maximum transmission power	approx. 1 mW
Sensitivity	-95 dBm
Frequency band	868 MHz
Input (3x)	Potential-free (Current pulse approx. 35 µA for 1ms every 0.5 sec)
Output (open drain)	Maximum switching voltage: 25 V DC Maximum inrush current: 2 A Continuous current: 650 mA Internal resistance (AN): 0.5 Ω
Battery life	approx. 6 years
Order number	**WN.LN.R.O.I/O**
Description	Battery-operated WaveNet LockNode (node for PC networking of digital components) without inputs and output
Dimensions (H x ∅)	37 mm x 53 mm
Power supply	2x CR2/3AA batteries, lithium 3.6 V Tadiran, SL761
Power consumption	Radio transmit: 32 mA; radio receive: 18 mA; Power consumption with no data traffic: approx. 20 µA Note: depends on data traffic and HF interference density
Maximum transmission power	approx. 1 mW
Sensitivity	-95 dBm
Frequency band	868 MHz
Battery life	approx. 6 years

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Order number	WN.LN.C
Description	WaveNet LockNode with RS485 interface for use in 'wired' WaveNet. (Node for PC networking of digital components) with 3 inputs and 1 output
Dimensions (H x ∅)	37 mm x 53 mm
Power supply	Connecting terminals for external power supply 6-24 V DC
Power consumption	See below → Power supply unit rating Power consumption with no data traffic: approx. 20 µA
Maximum transmission power	approx. 1 mW
Sensitivity	-95 dBm
Frequency band	868 MHz
Input (3x) N	Potential-free (Current pulse approx. 35 µA for 1ms every 0.5 sec)
Output (open drain)	Maximum switching voltage: 25 V DC Maximum inrush current: 2 A Continuous current: 650 mA Internal resistance (AN): 0.5 Ω

Note power supply unit rating for WN.LN.C:
An arithmetic value of 15 mA can be estimated for each LockNode.
15 mA (0.015 A) x number of LockNodes = total current → see 15.1

Order number	WN.LN.I
Description	Network knop **as retrofit knop to** integrating TN4-Cylinders
Dimensions (H x ∅)	26 mm x 30 mm
Power supply	3 V DC Batterie(s) TN4-Cylinder
Power consumption	current drain without data trafic: ca. 6 µA current drain with data trafic: ca. 30 mA
Lifetime	Up to 5 years Standby or 150.000 lockings
Max. transmission power effektiv (ERP)	ca. 0,4 mW bei – 4dBm
Sensitivität	-95 dBm
Range Central-/ RouterNode	Bis zu 30m (von Gebäudestruktur abhängig)
Ausgelagerte Antenne	Wird nicht mehr benötigt!
Input / Output	no
Umgebungsbedingung	Bis – 15°C mit 45% rest capacity batterie / bis + 50° C
Wetterfest (.WP)	waterproof availible
Sonderknäufe	no