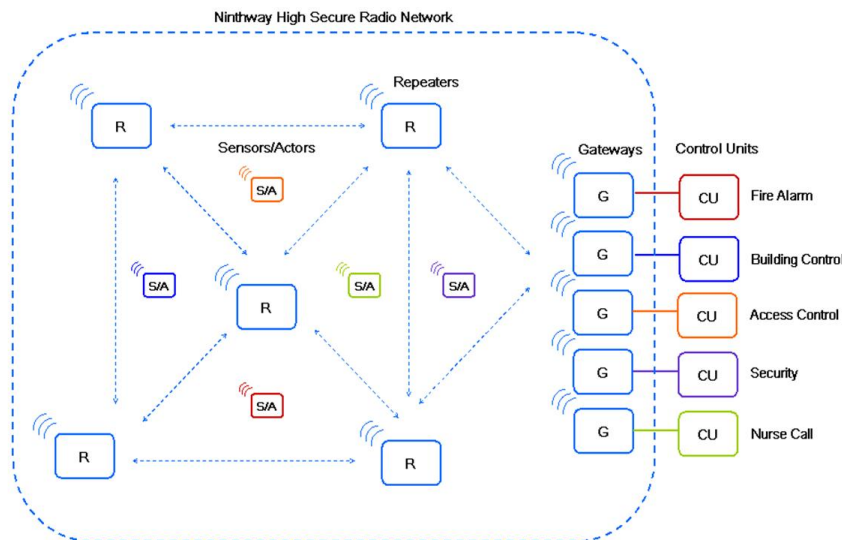


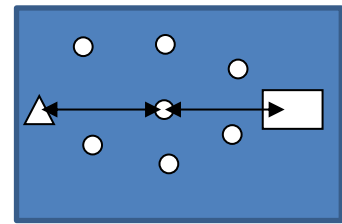
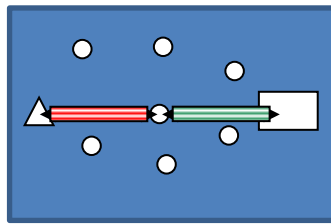
NINTHWAY HIGH SECURE RADIO NETWORK

The network			
 <p style="text-align: center;">Ninthway High Secure Radio Network</p>			
Standards:	EN300-220-1 EN300-220-2 EN300-220-3 IEEE 802.15.4 EN54-4 EN54-18 EN54-25	Article number:	N-HSRN
Specifications			
DSSS satellite technology	<p>The core of the system is the use of Direct Sequence Spread Spectrum (DSSS) coding, a technique originating from satellite communication. DSSS coding means that the individual data bits in the data frames are represented by a special sequence of zeros and ones during transmission.</p> <p>This causes the signal to be spread over a wide bandwidth. A signal from a co-user in the band will only be able to partly cover the DSSS signal. The rest is enough to reconstruct the original coded bit. DSSS is therefore a very reliable coding technique to prevent loss of signal through interference from other radio sources. It also makes it impossible to read the signal with non DSSS radio equipment.</p>		

NINTHWAY HIGH SECURE RADIO NETWORK

The network

DSSS vs. single frequency



End station

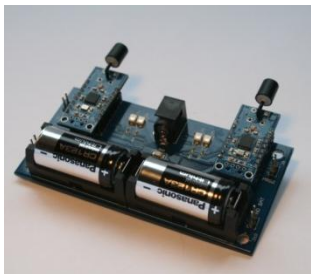


The Network consists of end stations using the NTM to transmit and/or receive data frames, to and from gateways, via repeater stations.

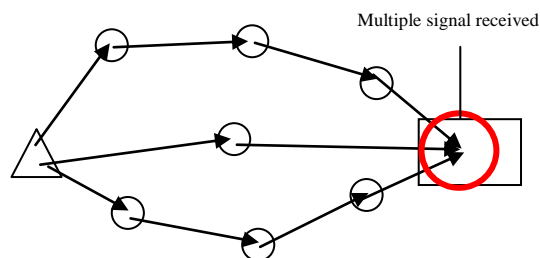
The Ninthway HSRN applies the philosophy to transmit the *information via as many routes as are possible* over a wide mazed grid.

Because of the large range of an NTM transceiver, only a limited number of repeater actions are required to transmit the signal to a base station.

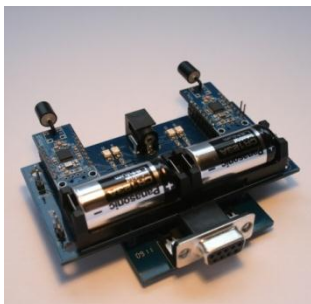
Repeater



Proper alignment of the repeaters provides the possibility to have the signal reach the base station from several different directions, circumventing possible blocked links and preventing the possibility of destructive interference at the base station site. Its capacity reaches in the thousands of elements.



Gateway



Gateways and repeaters use standard NTMs with function 2 (Repeater) activated.

Repeaters

A repeater consists of two NTMs. One communicates in the SAN frequency, the other on the BBN frequency.

For the user these two devices act as one.

The repeater handles:

- only frames with source addressing with the proper network number
- It does not repeat beacon signals

NINTHWAY HIGH SECURE RADIO NETWORK

The network	
	<p>It keeps a record of repeated frames and will not repeat old frames. An NTM repeater network is an open network and can be used by all devices using IEEE 802.15.4 frames with the same network number.</p> <p>Frames received on SAN will be rebroadcasted on BBN. Frames received on BBN will be rebroadcasted on BBN.</p> <p><u>Gateway</u></p> <p>A gateway is a repeater that <u>does not repeat</u> and will convey only frames to the gateway module:</p> <ul style="list-style-type: none"> - with proper network number - with the proper gateway number - proper OEM_ID. <p>Gateways are tied to an original equipment manufacturer. This guarantees private use of a connection to the open NTM network. It prevents signals not meant for the application connected by the gateway, to enter the application controller and cause false signalling.</p> <p>Commands sent to the gateway are broadcasted on both frequencies.</p>
Controlling Actors	<p>The network combines three requirements:</p> <ol style="list-style-type: none"> 1. It is open for any application using a NTM transceiver with the proper network ID. 2. Gateways only handle signals from devices associated with the application they are linked to. 3. Gateways only handle signals from devices with the right OEM-ID. <p>Each network can host 16 different gateways. Each gateway can host 4095 devices.</p> <p>Together this forms the device address with an address space of 65535 devices per network ID.</p> <p>Sensors send their information accompanied with their device id as source address. These frames are readily retransmitted by repeaters and received by gateways.</p> <p>Sending data to devices (<u>actors</u>) is slightly different. Due to the nature of the IEEE802 standard, a transmission using a destination address cannot be repeated. So sending information to a device behind one or more repeaters can only be achieved indirectly.</p> <p>And there is more. Normally a device is operating in power down mode. To control the device or send data to it, the device needs to have its receiver activated before information is sent to it. This is done by synchronising the sleep/wake cycle of an actor with the beacon signal from a repeater.</p>

NINTHWAY HIGH SECURE RADIO NETWORK

The network	
	<p>After installation and power up, an actor will associate itself with a repeater and synchronise its clock to the beacon signal of that repeater. A frame meant for an actor is relayed by a repeater directly after the beacon signal.</p> <p>This control can be achieved individually as well as per group. A so called control or alarm group number can be attached to a device. There is room for 255 different alarm groups.</p> <p>The SENT_("send to") command sends a frame to a destination, but this frame will not be repeated by a repeater.</p>
Remote control	<p>A consequence of the IEEE 802.4.15 standard is that a repeater will not relay frames that contain a destination address. To be able to control devices behind repeaters, indirect destination addressing is required. For a user this translates into two special commands.</p> <p><i>CGRP grpnr destination data data data ...LF; Spaces are mandatory.</i></p> <p>This command sends a block of data (up to 100 bytes) to either devices with group number grnr 1 – 255 or to a particular destination address. Both parameters need to be provided. If only one is to be applied fill in 0 for the other. It is typically meant to control parameters of the application. The exact format of data is determined by the API routine of the actor.</p> <p>Similar, parameters of the transceiver proper can be remotely set using the RMOT command.</p> <p><i>RMOT destination command command command...CRLF; Spaces are mandatory.</i></p> <p>Example: RMOT 123 VOLT?CRLF will have number 123 send back a frame holding in its payload a string like : "VOLT=50".</p>
Additional information	<p>Datasheet NTM_3 Application note 1 Programming the NTM Datasheet repeater Datasheet gateway</p>