

# Marvelmind SW pack v7.0/v7.1 release notes

## Summary:

- Marvelmind SW pack v7.0/v7.1 is a major SW release containing multiple SW improvements and multiple new SW features.
  - The improvements are a combination of bug fixes and various usability improvements based on the customers' feedback
  - The new SW features are mostly focusing on larger and more complex maps containing multiple submaps
- We plan to continue the following practice of publishing SW releases:
  - One major SW release (v7.xxx, v8.xxx, etc.) about every six months
  - One-two minor (mostly, bug fixing) releases (for example, v7.2xx, v7.3xx, v7.4xx, x7.5xx) with some new features
- The SW pack from now on will be split into two parts - Base and Optional:
  - Base SW pack – v7.000 in this release – no SW license purchase required
  - Optional SW pack – v7.100 in this release – SW license purchase (9 EUR/beacon) required: See [MMSW005](#) in [Products](#)
  - SW pack v7.100 also gives access to all features of SW pack v7.000

# SW packs: v7.0 vs. v7.1

	SW pack v7.0xx – Base SW	SW pack v7.1xx – Optional SW
<b>Content</b>	<ul style="list-style-type: none"> <li>– Bug fixes</li> <li>– Multiple improvement features combined in a pack</li> </ul>	<ul style="list-style-type: none"> <li>- Optional and advanced features combined in a pack</li> <li>- Focus – larger maps with multiple submaps</li> </ul>
<b>Need to purchase license</b>	<p>No need to purchase a separate SW license.</p> <p>For example, you just plan to purchase a Starter Set Super-MP and 5 additional mobile beacons and to see how precise the tracking is - No additional licenses are required. Everything is already included in the price of the set and the mobile beacons</p>	<p>The SW upgrade license is required – <b>9 EUR/beacon</b>.</p> <p>The license is issued per beacon. Thus, for example, if you have a Starter Set Super-MP containing 5 x beacons and 1 x modem and you want to use some advanced features from the SW pack v7.1 list, you need 5 x licenses SW pack v7.1, because you have 5 beacons</p>
<b>Naming</b>	v7.0xx, v7.2xx, v7.4xx... v8.0xx, v8.2xx – Base SW pack - even	v7.1xx, v7.3xx, v7.5xx... v8.1xx, v8.3xx – Optional SW pack - odd
<b>Upgrades examples</b>	<ul style="list-style-type: none"> <li>– v7.000 =&gt; v7.025 – bug fixes. No license purchase required</li> <li>– v7.000 =&gt; v7.100 – upgrade within a release. License purchase required - 9 EUR/beacon</li> </ul>	<ul style="list-style-type: none"> <li>– v7.100 =&gt; v7.125 – bug fixes. No additional license purchase required. It is assumed that you have purchases v7.1xx already</li> <li>– v7.100 =&gt; v8.000 – new major SW release. No license purchase required. You keep all SW features from v7.1xxx and get all new features of the Base SW pack v8.000</li> <li>– v7.100 =&gt; v8.100 – new release upgrade. License purchase – 9 EUR/beacon. You keep all Optional SW v7.1xx features, get all SW Base v8.000 features and get all v8.100 SW features</li> </ul>
<b>License terms</b>	Perpetual	Perpetual

# Support of mature products

Most new features are introduced to new and more capable products only: Super-Beacons, Industrial beacons, Mini-RX beacon and product based on it (Helmet, Jacket, Badge, Cap, Headlight, Watch), Modem v5.1, Super-Modem.

Support of new features by Beacons HW v4.9, Modem v4.9, Mini-TX is limited and pretty much accidental rather than intentional. The SW richness for these products remains nearly on the same level as in previous releases.

# New SW features v7.1 – page 1

- MMSW7100: Simultaneous SW re-flashing of multiple beacons over radio
  - Very practical and very useful feature for large maps, when you need to upgrade SW on multiple beacons, particularly, without an easy physical access via USB. Extremely useful in complex radio environment with interference or weak RSSI between beacons and modem
  - Different colors show upgrade and success status with different beacons
- MMSW7101: Map uploading to mobile beacons without a need to unfreeze the map (Changed: now a part of v7.0)
  - When a new mobile beacon (hedge) is introduced to the network, it must know the map. When the map is frozen together with the hedges in the network, the map is automatically uploaded to all of them over radio. But when the network is already up and running an introduction of new hedges (for example, new workers or new forklifts or robots) to the running network is not a trivial task. This feature makes it possible without the network interruption
- MMSW7102: IMU filtering
  - Filtering of ultrasonic tracking based on the IMU data and the allowed speed and acceleration of the mobile object. Greatly improves tracking in challenging and noisy environment
- MMSW7103: Helper beacons in IA
  - In complex maps, it is possible to add special helper beacons to simplify building of large IA maps and increase tracking quality

# New SW features v7.1 – page 2

- MMSW7104: Exclusion of submaps from tracking and sending submaps to sleep
  - When building large maps and setting up handovers, it is very useful in practice to send some of the submaps to sleep (not beacons, but the whole submaps) while working with other submaps or excluding them from tracking
- MMSW7105: Geofencing zone number in streaming and log
  - The output data contains info which zone exactly was violated – not just there was a violation – very useful in larger maps
- MMSW7106: Self-oscilloscope over radio
  - In complex maps when stationary beacons can be 10-15m above the grounds it is can be difficult in practice to check whether the beacons are not damaged, for example, broken sensors due to mechanical hit or moisture or similar. Normally, it is done over the USB. The feature allows to perform the tests over radio
- MMSW7107: Special mode “Only selected transmitters” in oscilloscope for MF NIA
  - Greatly helps building complex MF NIA maps with large dynamic range of distances from stationary beacons to mobile

# New SW features v7.1 – page 3

- **MMSW7108: Advanced log format**
  - The feature greatly extends richness of the log file adding the following fields into it: raw IMU (accelerometer, gyro, compass), IMU fusion (location (HW4.9-IMU), quaternion, speed (HW4.9-IMU), acceleration (HW4.9-IMU)), geofencing zone number, NMEA0183, User payload, Realtime Player data. The feature is particularly useful for complex cases
- **MMSW7109: Geofencing alarm pin on modem**
  - When a geofencing rule is violated by any mobile beacon in any geofencing zone the pin is activated. It can electrically trigger a large physical alarm or stop a mechanism, for example
- **MMSW7110: Advanced API**
  - Adding and deleting submaps, freezing/unfreezing map and submaps, changes of settings of submaps, erase map, defaulting, binding beacons with axes, reading/writing dumps of flash memory, manual entry of coordinates of stationary beacons and distances between them, heights of beacons, setting georeferencing, settings of Realtime Player in hedges, update rate changes, location update on request
- **MMSW7111: Selective uploading of submaps**
  - It is possible to upload only a part of a map. Greatly helps when deploying larger and complex maps
- **MMSW7112: CTRL+Z/CTRL+Y for operations with submaps**
  - Undo/Redo operations – greatly simplifies operations with submaps during deployment of larger and complex maps

# New SW features v7.1 – page 4

- MMSW7113: Drawing visual zones in Dashboard
  - The feature allows to draw zones in the Dashboard for visualization – basic graphics – quick and dirty. The feature compliments a graphical file that can be uploaded as a substrate in the Dashboard – floorplan. But, often, it is not available. Thus, it can be sketched directly in the Dashboard

# New SW features v7.0 – page 1

- **MMSW7000: Multi-stage SW re-flashing over radio**
  - Extremely useful in complex radio environment with interference or weak RSSI between beacons and modem. It is sister feature of a feature from v7.1 - Simultaneous SW re-flashing of multiple beacons over radio – but works with one beacon at a time
- **MMSW7001: System-level location update on request**
  - With this feature, the system is not updating location of mobile beacons all the time, but on the request only. The beacons are not emitting ultrasound. The request can be a button pushed in the Dashboard or an API command or a physical button connected GPIO of the modem pushed. Works in IA, NIA, MF NIA
- **MMSW7002: Beacon-level location update on request**
  - With this feature, the beacon is not streaming out its location all the time, but on the request only. The request can come via UART/Virtual UART over USB or via the beacon's GPIO (UART-RX pin)
- **MMSW7003: Alternate ultrasound emission by TX4/TX1-2-3-5**
  - Useful to combat inter-transducers interference in special complex cases of slow-moving mobile or static objects



# New SW features v7.0 – page 2

- MMSW7004: Manual selection of the DSP filter in the embedded oscilloscope
  - Simplifies debugging in complex IA cases
- MMSW7005: Mini-RX-2 support
  - New an improved HW version of Mini-RX – also a part of Jacket, Badge, Helmet, Cap
- MMSW7006: Support of country-specific radio profiles
  - Now, it is possible to either download your country radio profile, for example, Japan, Korea, US, EU, etc. or edit or create your own radio profile to introduce some specific customization in the radio interface. Note that the support of the radio profiles doesn't mean that the profiles are readily available. They will be introduced need based starting from Japan and Korea
- MMSW7007: Support of 915 MHz band with multiple channels from 903 MHz to 926 MHz
  - Previously, by default, only 4 channels were available – very useful in complex radio environment, for example, when you have telemetry on 915 MHz or other devices in the same band nearby. Now, it is possible to have multiple channels. Special radio profile file is required
- MMSW7008: Possibility to choose one of the two stereo-microphones in Omni-Microphone
  - Super-Beacons, Mini-RXs and Industrial Super-Beacons and Industrial-RX support up to two stereo microphones. Omni is a combination of two stereo microphones, for example. This feature allow choosing one of them. It is very useful in complex interference or noise environment for debugging during deployment or real usage cases

# New SW features v7.0 – page 3

- MMSW7009: Streaming of 100Hz Realtime Player in NIA (all beacons except for Beacons HW v4.9 and Mini-TX)
  - Previously, supported in IA only
- MMSW7010: Tracking on unfrozen map and submaps
  - Previously, the system required the submaps and maps must be frozen before tracking could be possible, because the maps are uploaded to mobile beacons during the freezing of the map. But many customers forgot doing the freeze thus they were not getting any tracking at all
- MMSW7011: API and Dashboard for Linux for ARM64
  - Previously, Windows 32-bit, Window 64-bit, Linux x86-64, Linux ARM32. Note that there are many flavors of Linux packs and some of them may differ from other and not always work similarly or correctly
- MMSW7012: Backup copy of map in modem
  - A precautionary measure for larger and complex maps with multiple submaps against accidental corruption by users or the system
- MMSW7013: Log of user's actions in Dashboard
  - For debugging of deployment of large maps. Stored as a separate file in the Dashboard folders

# New SW features v7.0 – page 4

- **MMSW7014: Manual or automatic rebuilding of a map. Manual after unfreezing**
  - Previously, the map would rebuild itself automatically after unfreezing. In complex maps it could lead to undesired changes that were difficult to catch, prevent or revert
- **MMSW7015: Manual confirmation of some operations in submap**
  - With some operations in complex submaps it is safer to manually request uploading the changes from the Dashboard to the modem and thus applying to all beacons. Particularly helpful in operations with larger maps
- **MMSW7016: Half-bandwidth receiving DSP filter**
  - A major improvement particularly important for noisy environment: up to 6 dB signal-to-noise improvement
- **MMSW7017: SW support for Marvelmind Belt**
  - Marvelmind Belt is a new product: belt with a beacon and two additional microphones. Designed for applications when there is a robot/AGV following a person. Works in IA. “Stationary” beacons are installed on a moving robot/AGV with a base of 0.5-2m
- **MMSW7018: SW update of Super-Modem via Dashboard**
  - After updating to Marvelmind SW v7.0, it would be possible to upgrade Super-Modem SW via the Dashboard. Previously, it was possible only by uploading an image to the internal micro-SD card (housing opening required)

# New SW features v7.0 – page 5

- MMSW7019: Setting of WiFi and UDP directly from the Dashboard
  - Previously, a special file shall be edited. Now, WiFi and UDP can be set directly from the Dashboard
- MMSW7020: Log of modem resets in Dashboard
  - Each reset of the modem is recorded in a special file in the Dashboard for detailed debugging or analysis of events that may be required in complex networks

# Improvements – page 1

- Improved handovers in IA and NIA
- Mobile beacon (“hedgehog” or “hedge”) doesn’t show on the Dashboard’s map if its coordinates are not determined
- Possible to change the height of the mobile beacons in IA without a need to unfreeze the map
  - Previously, it was necessary to unfreeze the submap and map, change the heights and freeze again
- Streaming out data contains now a sign of absence of data if they are absent
- Now the SW pack contains different folders for different types of products: Helmet, Badge, Cap, Jacket, Watch, Headlight. Though, they all are based on Mini-RX, their settings (mainly external microphones settings) are different. Thus, previously pressing Default button would lead to defaulting setting to those of Mini-RX – not specific to the products
- Streaming of NMEA in Modem v5.1 and Super-Modem supported now
- UDP from Dashboard and from Super-Modem streams exactly the data than UART or virtual UART of beacons
  - Previously, UDP streams were less rich than UART or virtual UART

# Improvements – page 2

- RSSI from modem to beacon and from beacon to modem
  - Previously, the beacon is only showed how it hears the modem over radio, but not how the modem hears it. The modem showed RSSI from a random or last selected beacon
- If a power save mode is not possible in a beacon due to settings, the reason is shown on the notification panel in the Dashboard
  - Previously, the beacon could do that without notifying users
- It is possible to delete Submap 0
  - Previously, Submap 0 involuntary became since it couldn't be deleted
- Choosing Omni microphone in microphone configuration options
- New interface in Load map in Dashboard
- Improved oscilloscope: trigger distances and other improvements
- After submap unfreezing it switches to Auto mode – not Manual mode as before – and starts automatically measure distances between stationary beacons (if supported, for example, by Super-Beacons)

# Improvements – page 3

- Floorplan/substrate workflow improvements and changes
  - Possible to drag and drops beacons or, be more precise, submaps with beacons
  - “Nailing” of stationary beacons is introduced. If a stationary beacon is nailed to a substrate, it will not move, if another stationary beacon in the same submap with a known/measured distance between them from the same submap or linked submaps will be manually moved. Instead, a new distance will be automatically calculated by the system and set instead of a measured distance by the system. This allows manual setting of positions of beacons on the floorplan/substrate
  - Stationary beacons with manually set coordinates are marked by a diagonal cross. Nailed beacons – by a vertical-horizontal cross
- Mouse right-click over a beacons shows a context menu – the same a menu over the bottom beacon button
- Possible to change the radio base frequency
- Support of a wide 915MHz band – now from 903MHz till 927MHz

# Bug fixes – page 1

- Fixed a bug with 5 frequencies (19, 25, 31, 37, 45 kHz) in a map simultaneously
  - Previously, in some cases, maps with 4 frequencies worked, but they didn't work with 5 frequencies
- Corrected calculations of longitude in NMEA
- Fixed a bug in the paired microphones
- Speed in NMEA in NIA
- Data transfer between hedges over UART when they are USB connected to external users, for example, in a robot
- Map building in IA, when hedges are already active
  - Previously, often, it was required to build a map with stationary beacons active. Freeze the submap. Wake up the mobile beacons. And only then to freeze the map. Now the map can be built with all required stationary and mobile beacons already active
- Small submaps in NIA
  - Previously, submaps under 1-2m of size worked strangely
- u-Blox for Super-Beacons-2
  - 4x4 pinout is slightly different for Super-Beacons and Super-Beacons-2. Now, corrected



# Bug fixes – page 2

- Oscilloscope in TDMA maps
- Table of distances in TDMA maps
- Saving of manually entered distances in the table of distances in the modem
  - Previously, they saved values could be corrupted
- Manual entry of coordinates
- Multiple geo-fencing zones
- Submaps with 4 stationary beacons in IA
  - Worked with 1, 2, 3 frequencies (beacons), but didn't properly work with 4 frequencies (beacons) per submap
- Oscilloscope for submaps larger than 50m
- Chain of submaps doesn't broke now when one of the submaps is modified
- MF NIA with repeating ultrasound frequency in mobile beacons
  - Previously, in such configurations tracking wasn't stable

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# Bug fixes – page 4

- Some bug fixes for stationary beacons with manually set coordinates
- No sudden jump of a submap after one or more beacons are removed from it
- Uploading of scheduling in stationary beacons fixed
- Reading of telemetry improved (there were some drops)
- Fixed location measurements with 4 stationary beacons in IA. Previously, not the best candidate could be selected in some cases and, occasionally, with 3 beacons even not calculated at all
- Tracking in IA in the Paired Beacons configurations when the beacons are not UART cable connected. Now, only angle wouldn't be updated (UART cable is required for that). Previously, even coordinates wouldn't be available
- Chosen filter in the embedded oscilloscope is shown correctly now

# Bug hunting and rewards scheme

We are happy to offer a bug hunting rewards scheme that aims at supporting our active users and improving the quality of the SW at the same time:

Bug level	Rewards
<b>Major bugs:</b> <ul style="list-style-type: none"><li>– The system is completely incapable to perform as advertised</li><li>– Crushing or freezing Dashboard, beacons, modem and similar</li></ul>	<ul style="list-style-type: none"><li>- Voucher for the total cost of Optional SW pack v7.1xx you purchased</li><li>- If the bug was found in the SW pack v7.0xx – voucher for SW v7.1xx</li><li>- Up to 50 beacons</li></ul>
<b>Intermediate bugs:</b> <ul style="list-style-type: none"><li>– The system is capable to work, but with serious limitations</li><li>– Rare configuration or combination of settings doesn't work at all</li></ul>	<ul style="list-style-type: none"><li>- Voucher for the total cost of Optional SW pack v7.1xx you purchased</li><li>- If the bug was found in the SW pack v7.0xx – voucher for SW v7.1xx</li><li>- Up to 20 beacons</li></ul>
<b>Minor bugs:</b> <ul style="list-style-type: none"><li>– Glitches and bugs that don't disturb most users but still shall be fixed</li></ul>	<ul style="list-style-type: none"><li>- Voucher for the total cost of Optional SW pack v7.1xx you purchased</li><li>- If the bug was found in the SW pack v7.0xx – voucher for SW v7.1xx</li><li>- Up to 5 beacons</li></ul>
<b>Improvement and new feature proposals</b>	<ul style="list-style-type: none"><li>– Voucher for 1 ... 50 of SW v7.1xx licenses - depending on the level of improvement. Capped by the number of beacons you already have</li></ul>

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[https://marvelmind.com/#watch\\_demo](https://marvelmind.com/#watch_demo) – selected video demos

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