„WiFi Model Railroad“ presents their 2nd generation WiFi-Loco decoder

LOCOFI’S SECOND AIR BRIDGE

It is impossible to imagine modern communication without WLAN or WiFi, and this is also true for model railways: Finally, WiFi became "socially acceptable" with the Roco/Fleischmann z21 or Z21. Since then, hardly any issue of DiMo goes by without new products and projects using wireless data transmission being presented.

In addition to the wireless connection between computer, tablet or smartphone and the digital control centre, applications are increasingly coming to the fore in which setting commands for points and signals as well as track occupancy and track vacancy messages are transmitted wirelessly.

The advantage is obvious, especially for garden railways or mobile layouts such as modules, dioramas or more or less flying tracks on the floor: Wiring is reduced to a minimum, only one power supply is needed, either from the rails, a ring line or a battery carried in or on the vehicle.

What seems to be a logical consequence today, the direct control of traction units, is much older. As early as 2015, Roco brought train sets onto the market under the name "Next Generation" with a slightly stylised BR 120 that carried a WiFi receiver on the loco’s PCB. The locomotive was controlled via its own proprietary app with a game character - an inclusion in model railway operation was not readily possible. The locomotive and the control app formed a closed eco-system.

WiFi Model Railroad

A similar approach is taken by the US manufacturer "WiFi Model Railroad", but its products are aimed at the model railroader: The WiFi receivers are generic circuit boards for locomotive installation that are used in exchange for or in addition to the regular PCB in the vehicle.

Currently, two receivers are offered. They are short-circuit proof and have switchable LED headlights as well as an integrated sound reproduction. The loudspeaker in "double sugar cube format" (1.5W at 8 Ohm) is already connected to the circuit board and belongs decoder’s packet, just like the separate LEDs.

The motor output of type DDLLHA supplies up to 2 amps, in total it can be loaded with 3 amps. It measures 87,4 x 17,1 x 8,7mm and is offered for USD 97,75 (approx. € 81,-).

The smaller (50.4 x 16.4 x 5.7 mm) and less powerful (1 ampere motor current, 1.5 ampere total load) DDLLHB costs USD 106.25 (approx. € 88).

The decoders should be supplied with a smoothed DC voltage of 9 to 24 volts (DDLLHB: 7 - 24 volts). The supply voltage of the motor largely corresponds to the supply voltage of the LocoFi receiver. A capacitor installed on the circuit board helps to overcome insulated frogs or short (!) dirty rails.

Connecting

Both decoders are supplied with seven flexible strands about 10 cm long. Thankfully, the colours of the strands correspond to the usual standard for DCC decoders, although the green strand is missing: The decoders have no additional function output ("AUX"), but only the two outputs for the front lighting, which can, however, be switched separately.

If there is enough space in the vehicle, the wires of the receiver can easily be soldered to an 8-pole plug according to NEM 652 - otherwise rewiring the loco is necessary.

The two lighting outputs can be loaded with 10 mA each and can only operate LEDs. Further work may be required here when installing the LocoFi receivers: incandescent lamps must be removed and replaced with suitable LEDs. Four LEDs (3 mm diameter) are included with the decoder, the resistors are already installed directly on the circuit board of the receiver module.

Depending on the locomotive model, modifications to the existing mounting of the bulbs may be necessary, especially for small cable bulbs. The same is the case if the vehicle to be converted is equipped with individually and directly illuminated head lamps. A more flexible solution would be desirable here - at least for the European market.

„Wroom....“

The decoders can replay sounds. The sound files can be called up individually and include start, idle, stop, horn and bell. The idling sound is varied during operation depending on the speed in the style of an increasing engine speed achieved by increasing the playback speed.

This conveys a good operating sound from a distance, but effects such as the engagement of a turbo charger, the load-dependent activation of a fan or the revving up of the engine before departure - typical of diesel-hydraulic vehicles - cannot be represented this way.

An adaptation for operation with electric locomotives is possible with some concessions, but for use with steam locomotives you have to wait for another version of the LocoFi receiver.

The use of own sounds is very easy, as the storage is done on a micro SD card that can be removed from the receiver. The WAV files on it can be exchanged or modified on a PC or Mac. For this purpose, an adapter to the "normal" SD card size is included with the locomotive receivers.

Configuration and Start

An Android smartphone or tablet with Android 5 or newer is required for configuration and operation. This means that "old bones" such as the author's Google Nexus 7 can still be used.

The connection between the smartphone or tablet and the receiver in the locomotive is established via WiFi in the common 2.4 GHz range. Before this is done, however, the LocoFi app must be retrieved from the GooglePlay store. The app does not make any special demands on the end device, so it can also be operated flawlessly on older devices.

After that, the radio network set up by the LocoFi receiver must be selected via the WiFi menu of the end device. Optionally, this can be renamed or the LocoFi receiver can be added to an existing WiFi radio network.

With a click on "Manage", the LocoFi app switches to "driver's cab mode" with a large red button for starting the vehicle. After selecting the direction of travel, the slider can be used to start driving, and the bell, horn and light can be operated.

Operation (bounderies)

The ESP components installed as WiFi receivers basically allow the setting up of an own WiFi radio network or the use of an already existing radio network.

If the (or each) locomotive spans its own radio network, spontaneous operation is possible without further components. The other side of the coin is the necessity to change the radio network when calling another locomotive. Spontaneous operation with several vehicles and only one control unit is practically impossible in this operating mode - but for this purpose there is the second operating mode, in which the locomotives are "WiFi clients" in an existing WiFi.

This operating mode is advisable anyway when operating several vehicles in a comparatively confined space, so that the WLAN signals do not interfere with each other. In the 2.4 GHz band, only four channels can be used without interference - and there, the existing WiFi and those of the neighbours (esp. in crowded areas) may compete with the LocoFi receivers for the rare channels. Although this results in interruptions only in exceptional cases, the data throughput and the response speed can decrease.

Conclusion

The LocoFi receivers are (still) geared to the operation often found in North America, in which the locomotive drivers accompany their respective trains as "crew" on their way across the layout, set points manually if necessary and train movements are initiated by telephone, voice radio or signals - as is also the case with Fremo, for example.

Due to the fact that it is not yet possible to embed the LocoFi receiver in an existing digital operation, the control via LocoFi receiver would result in an isolated operation, as the LocoFi receivers also have no possibility of being controlled from outside in the sense of an “Indusi”.

On the other hand, LocoFi receivers can considerably expand analogue-controlled systems: In main line operation, the control is traditionally done via de-energised sections behind (!) the signals, in shunting operation, shunting can be done freely in constantly supplied sections - even with several vehicles.

The supply of the vehicles equipped with LocoFi receivers from the battery instead of the rail allows operation on dead track, e.g. for test runs during the construction period or as preparation for regular operation by a track cleaning train equipped in this way as a pre-run with vehicles supplied from the rail.

Outlook: What still comes...

WiFi Model Railroad is already working consistently on extensions: For example, the multiple tractions ("consists") that are often needed in the USA are at the top of the list. The iOS app, which is currently being developed, will also allow Apple smartphone and tablet users to participate in LocoFi operations. A dedicated LocoFi hand controller with rotary knob and physical buttons and switches is also planned.

Together with decoders for steam locomotives as well as decoders with further function outputs and a turnout decoder, an interesting eco-system is created alongside analogue and digitally controlled model railway layouts - whereby a merging or coexistence with digital systems and computer-assisted operation is already foreseeable through the planned integration with JMRI.

Dr. Bernd Schneider