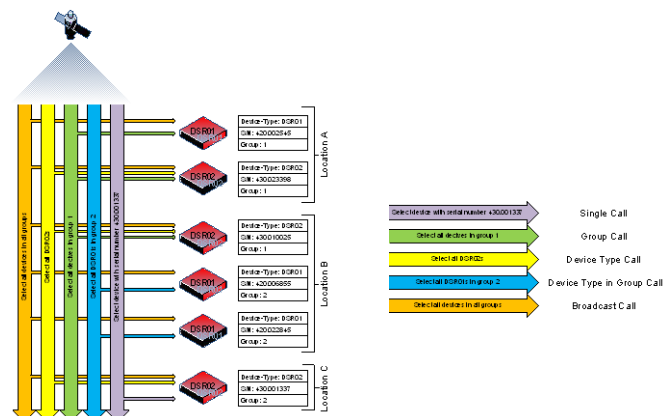
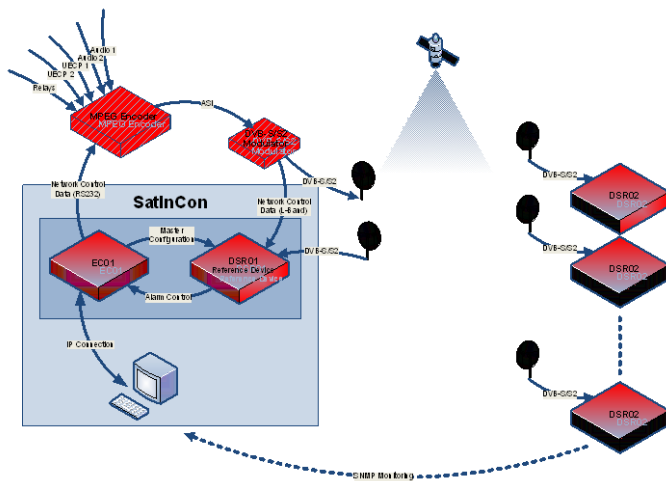


Satellite In-Band Remote Control System (SIRC)

Remote Network Control over Satellite



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Satellite In-Band Remote Control (SIRC)

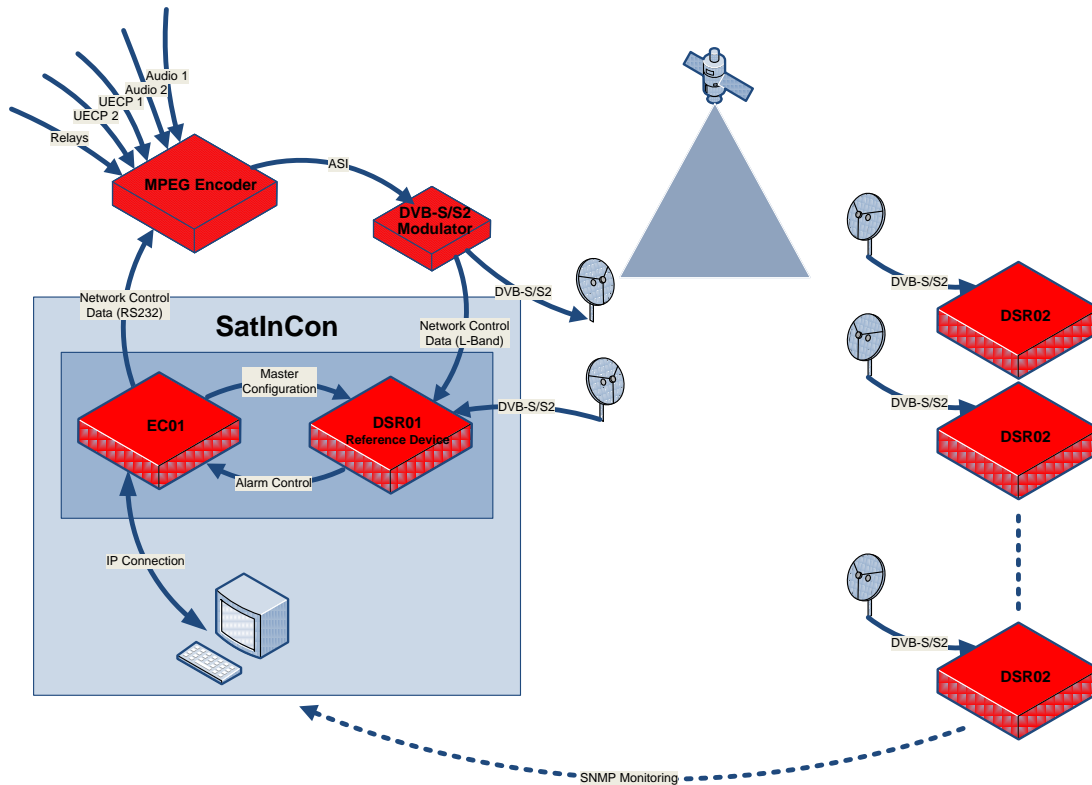
2wcoms Satellite In-Band Control (SIRC) provides a system that allows users to remotely manage and service equipment without the need of a physical network or internet connection. By injecting the necessary so called network control data into the MPEG2 transport stream at the satellite uplink station, the data can later be extracted and processed by the receiving equipment, completely removing the need for physical connections. This is especially useful when managing equipment in remote locations that have no or very poor outside connectivity. Also, data can be delivered safer and faster than by using telephone connections or the internet. For example, using SIRC to distribute a new configuration to a greater number of devices, this task can be finished within a few minutes, depending on the available bandwidth. And all it takes is just a few clicks.

On the following pages, the system is presented, followed by examples that explain how SIRC function work and where they can be applied.

The SIRC System

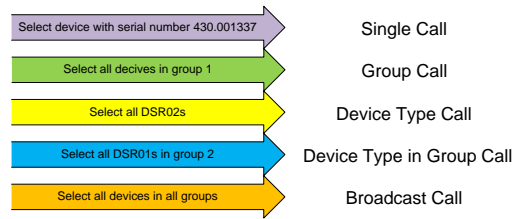
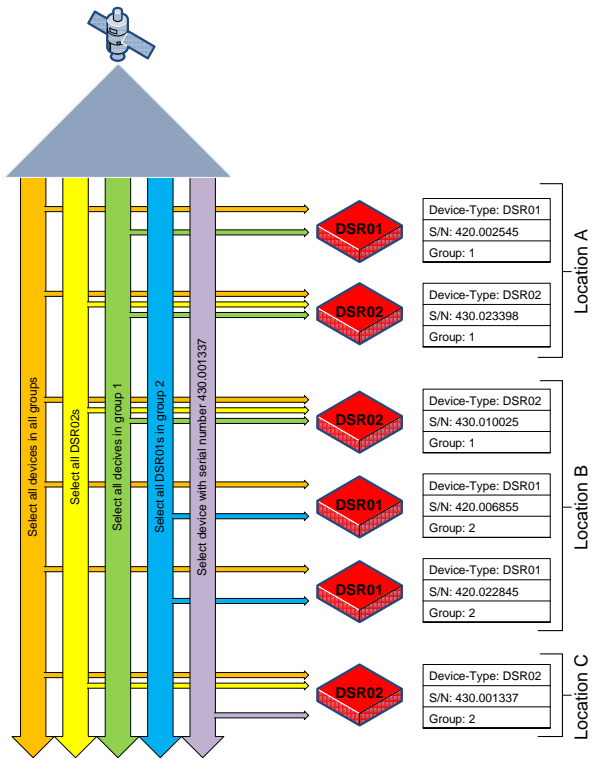
The SIRC system can be broken down into three stages:

- Configuration and monitoring stage: at the heart of the SIRC system is the Embedded Controller 01 or EC01. The EC01 schedules and generates the network control data to be sent to the remote devices. It also maintains a database of all receivers in the network, allowing for fast access to network components. The data generated by the EC01 is fed directly via RS232 connections into a MPEG encoder in the following stage. Data transmission and successful reception can optionally be verified using a DSR on site that is directly hooked up to the modulator in the next stage or is receiving the downlink from the satellite. This DSR can also be used to generate a configuration file to be uploaded to other receivers.
- Multiplexing and modulation stage: in this stage the network control data from the EC01 is multiplexed into MPEG ancillary data or private data inside the transport stream by a MPEG encoder. The transport stream multiplex is then modulated and sent through the uplink to the satellite. The L-Band signal from the modulator or downlink from the satellite can be used in the configuration and monitoring stage to verify the successful reception of the network control data.
- Reception, decoding and processing stage: while the other two stages are located at the uplink site, this stage is located at the downlink site(s). The network control data is extracted from the ancillary or private data sections in the MPEG transport stream, evaluated and, in case it addresses the device, is passed on for further processing. To ensure correct reception, all network control data is CRC protected.



Addressing

Before going into detail into the SIRC functions, it needs to be explained how devices can be targeted on the receiving end. 2wcoms SIRC system features a complete addressing solution, where receivers can be organized into groups, but can also be addressed by device type (i.e. DSR01, DSR02, etc.) or serial number. This enables the user to target single or multiple devices within a system and allows for an easy and straight forward way to organize and manage the system.

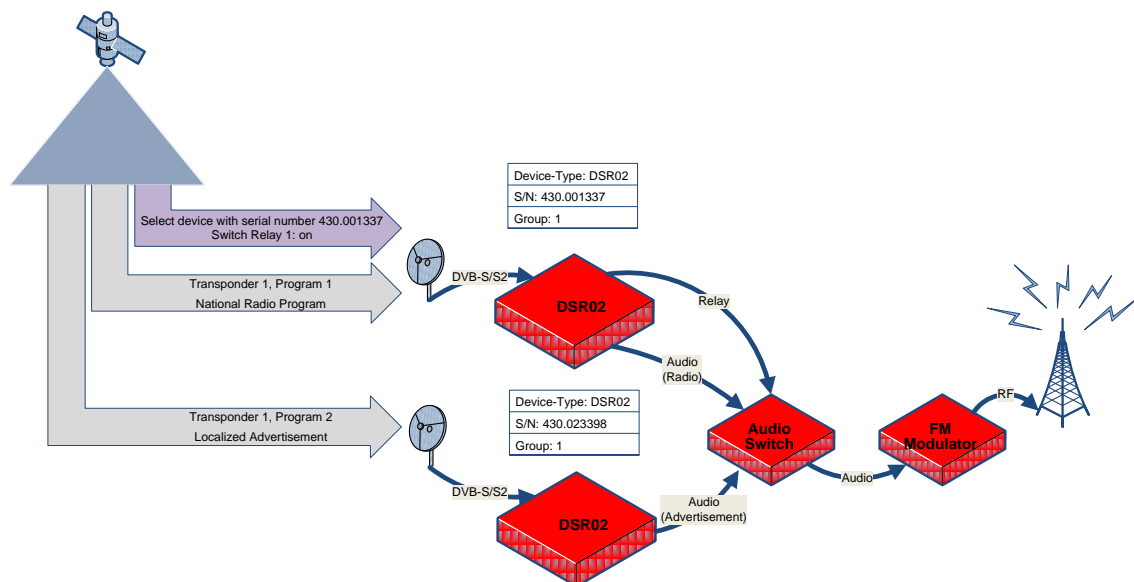


SIRC functions

SIRC gives users control over several functions, which will be described in detail below. While these functions encompass the current function set of SIRC, more functions can be implemented in the future to better suit the customers need. Please contact us for an offer.

Relay switching

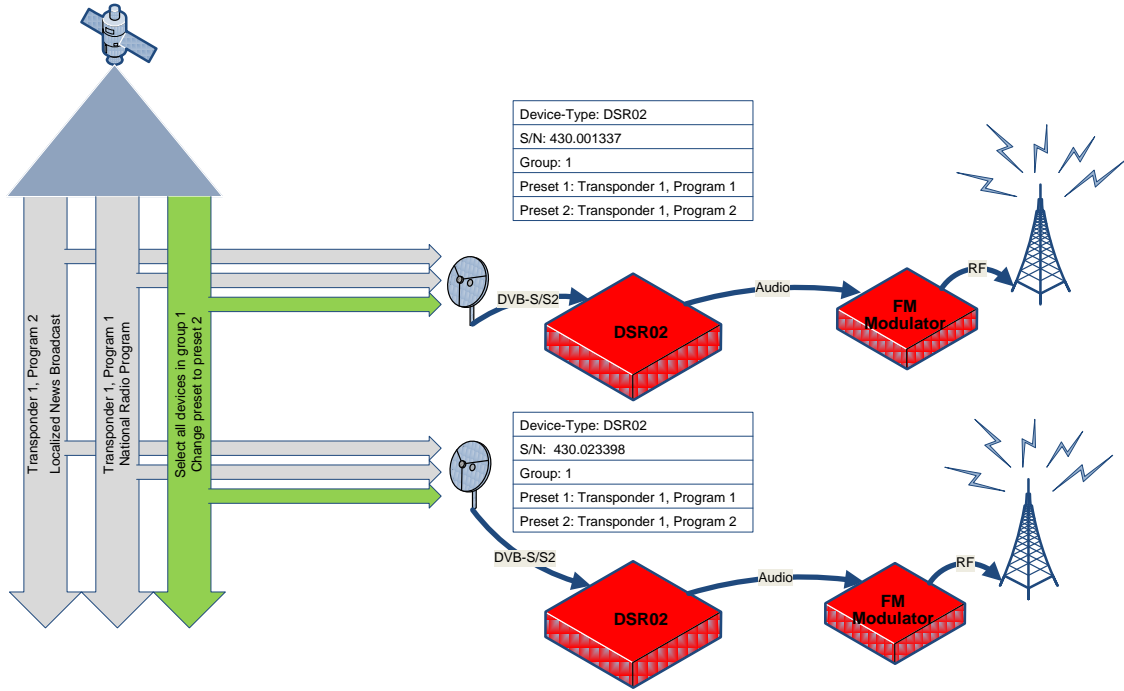
Use SIRC to switch a DSR0x relay remotely, for instance to activate an audio switching device to play different audio for a localized advertisement in a national radio program.



As soon as the upper DSR02 receives the relay switch command, it switches the audio switch from its primary source, the national radio broadcast, to the alternate source, the localized advertisement. Using the same command, the audio switch can be set back into its original state.

Preset change

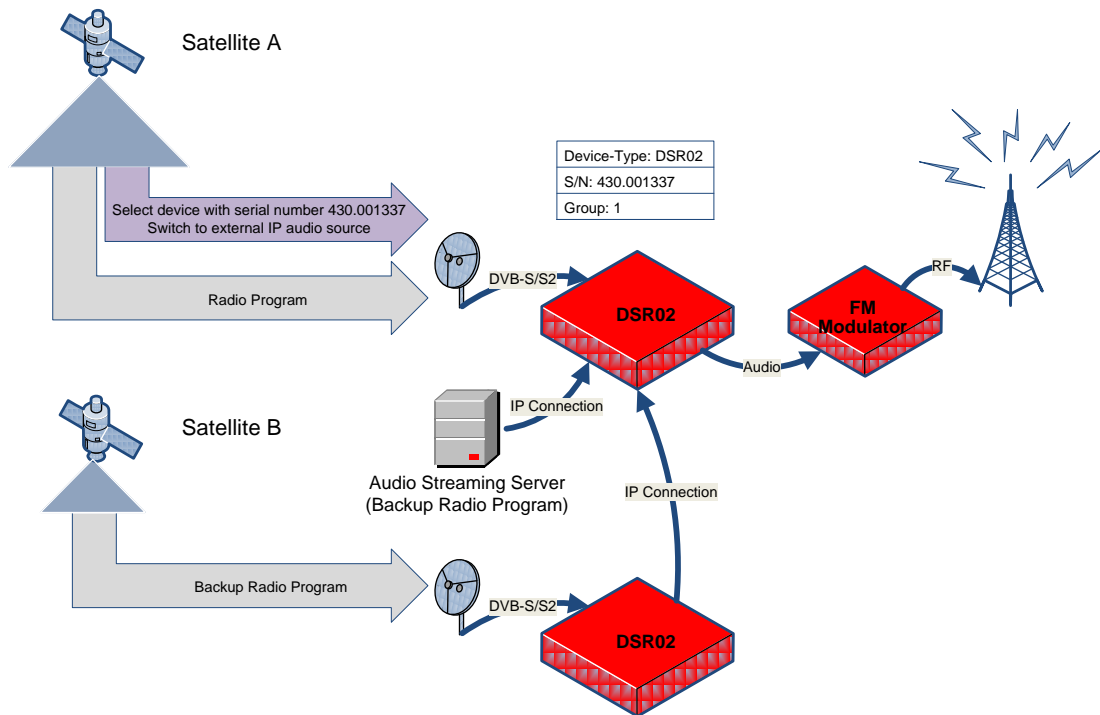
SIRC can also be used to change a DSR0xs preset. Presets are data sets that contain information about reception parameters (i.e. frequency, symbol rate, etc.), processing parameters (i.e. PIDs to decode/process, audio outputs to use, etc.) and device configuration (alarms, relay settings, etc.). So if for instance a national radio station has localized news, the preset change can be used to switch between the two broadcasts. For a smoother transition in between programs, the DSR0x can also be equipped with an audio fading option.



As soon as the DSR0xs in group 1 receive the change preset command, they switch from preset 1 to preset 2. If equipped with the audio fading option, the audio of preset 1 will fade out, preset 2 will be activated and when new audio is available the audio of preset 2 will fade in, allowing for a smooth transition in between source changes. At the end of the news broadcast, using the same command except now with change preset to preset 1, the original broadcast can be continued.

External audio source

An alternate audio feed is not available over satellite or on a different satellite? This is not a problem, as with SIRC DSR0xs can be instructed to use an alternate external IP audio source, be it a local audio streaming server or a remote Shoutcast server. Alternatively you can even use a second DSR0x as an IP audio source, for instance one that is using a different satellite.

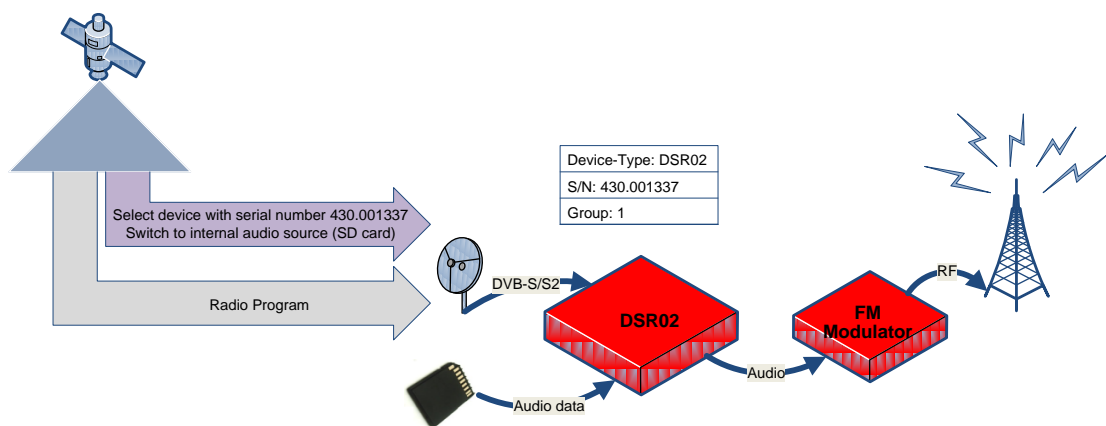


When the upper DSR02 receives the command to switch to the external IP audio source, it connects with that source and processes the incoming audio stream instead of the one coming via satellite A. If equipped with the audio fading option, the DSR0x will fade the satellite audio stream out as soon as IP audio data is available, which in turn will be faded in, allowing for a smooth transition in between source changes.

Alternatively, a second DSR02, in this example using a different satellite (B), can be used as an IP audio source. With IP audio streaming using a DSR0x, the original data from the transport stream is reused and no recoding is applied.

Internal audio source

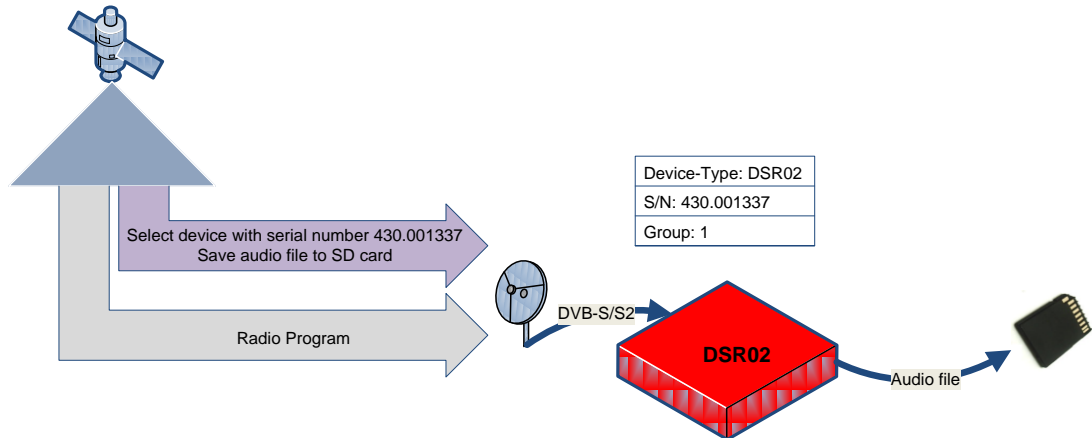
When the DSR0x is equipped with the new internal SD memory card option, SIRC can be used to play back an audio file from the SD card instead of using an external audio stream. This can be used for instance to play back local advertisements, to have an audio fallback as a last resort in case all incoming transmissions fail or for the continuous playback of a prerecorded message, as in a emergency warning system. Audio files can be uploaded using SIRC (see next SIRC function description).



In this example the DSR02 is instructed to switch to audio data stored on the internal SD card using SIRC. If equipped with the audio fading option, the DSR0x will fade the satellite audio stream out as soon as audio data from the SD card is available, which in turn will be faded in, allowing for a smooth transition between source changes.

File transfer to device

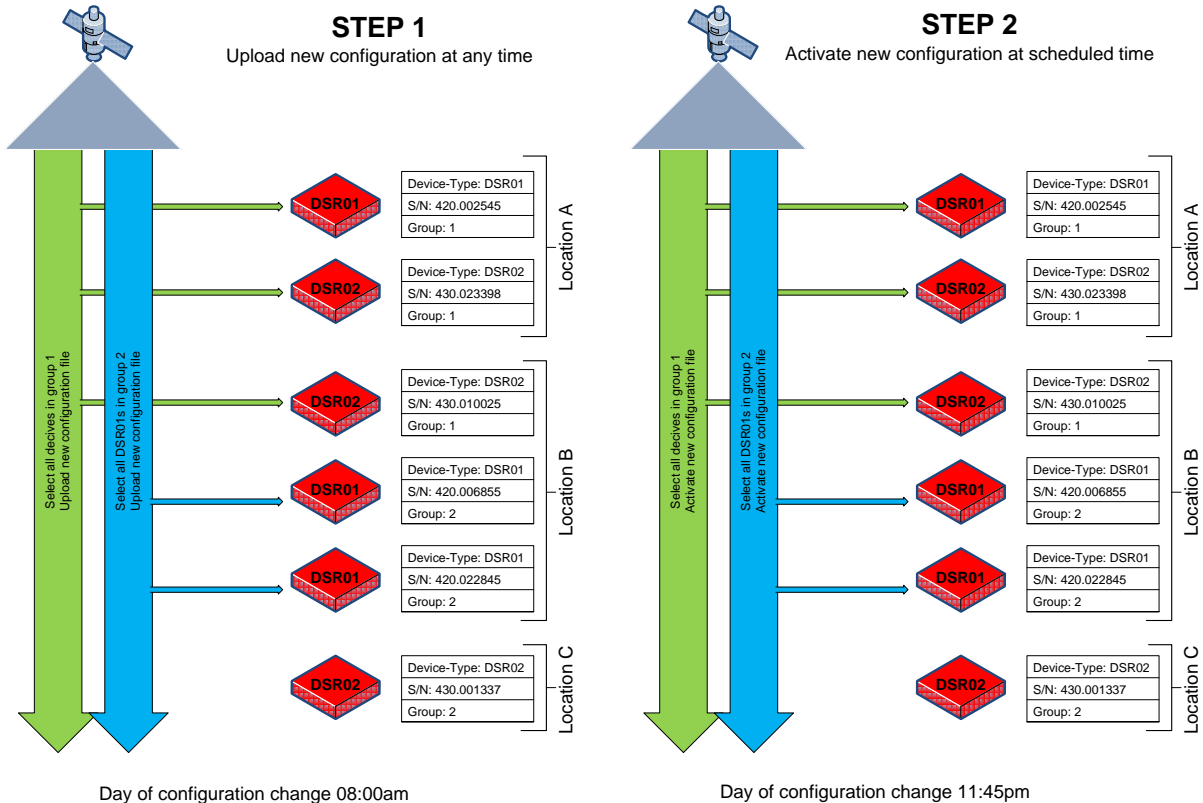
SIRC enables the user to remotely manage the contents of the internal SD card of a DSR0x (the SD card is optional and available only on newer DSR0x). If for example the SD card is used to store localized advertisements and new ad space is booked, the new audio files can be uploaded using SIRC file transfer function. All file transfers are CRC protected and can be repeated multiple times to insure that the data is received correctly in any case.



As the need for SIRC usually arises when there is no connection to the remote location, the SIRC management device the EC01 keeps track of what data is stored on the devices internal SD card. This way erroneous file uploads are avoided, for example of files that are too big to fit onto the card.

Configuration update process

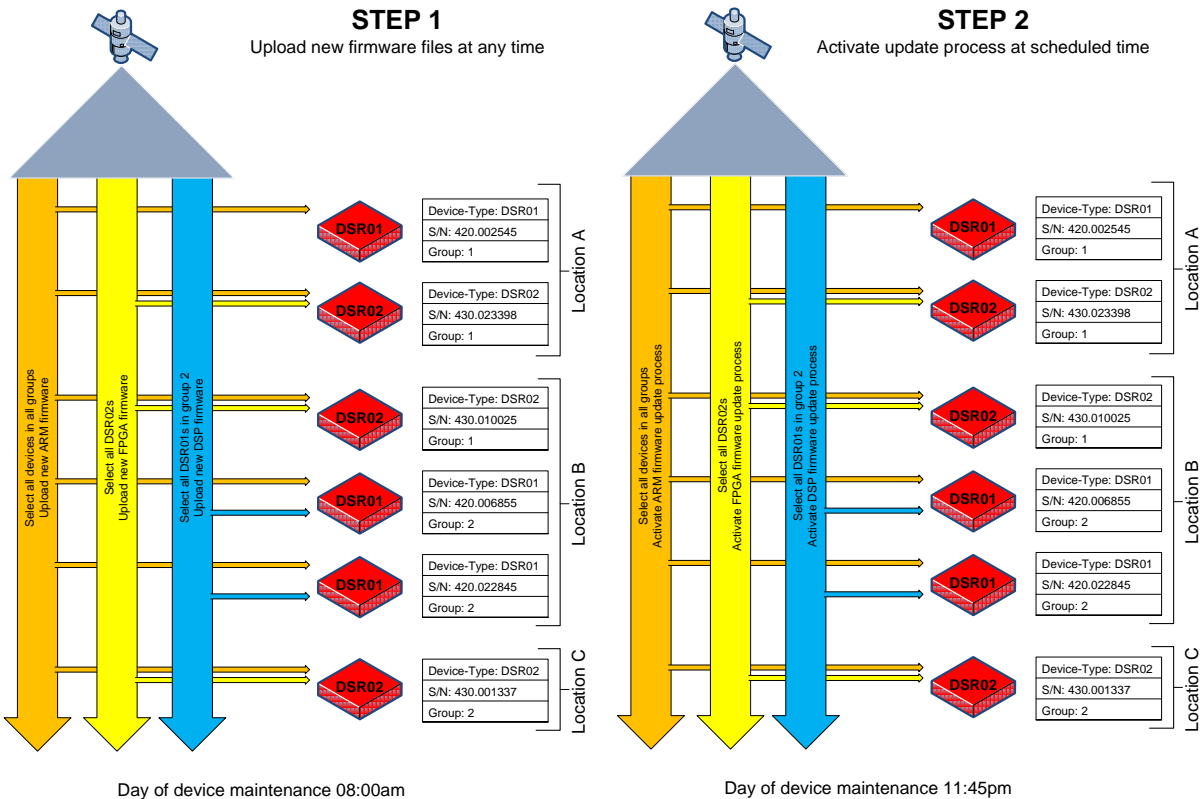
There are some times where the need arises to reconfigure devices in the field, for instance if the program distribution changes or processing jobs like monitoring or audio decoding need to be added or dropped. SIRC can be used to remotely distribute new device configurations via satellite in a two step process. In the first step, a new configuration file is uploaded to the devices. To ensure validity, all files can be sent multiple times and all files are CRC protected. The second step consists of activating the new configuration. This way, it can be ensured that there is ample time to successfully distribute the configuration files to all devices, before the configuration is activated at a time the user chooses.



In this example a configuration change is scheduled. At the beginning of the work day, the new configuration files are embedded into the transport stream and stored in the targeted devices. As transmission errors can occur, files can be sent multiple times, depending on how good reception properties are at given day. If for example there is a thunderstorm near one downlink site, that might give reason to increase the repetition times, to ensure successful reception. As in this example customers have been informed of a scheduled service downtime at 11:45pm for a few minutes, the configuration change activation command is issued via SIRC at 11:45pm. Moments later, all targeted devices accept the new configuration, restart and resume operation within seconds, except now they use the new configuration.

Firmware update process

Content delivery systems are improved and extended all the time. As it is impossible to foresee all developments, the need to update a devices firmware in order to keep up arises from time to time. With SIRC the user is able to distribute new firmware versions using the satellite link without the hassle to make roundtrips to remote locations that have no outside connection. The process is similar to the configuration update process function, discussed before. In two steps, the new firmware files are distributed and later on the firmware update process is activated. As with all file transfers in SIRC, firmware files are CRC protected before transmission.

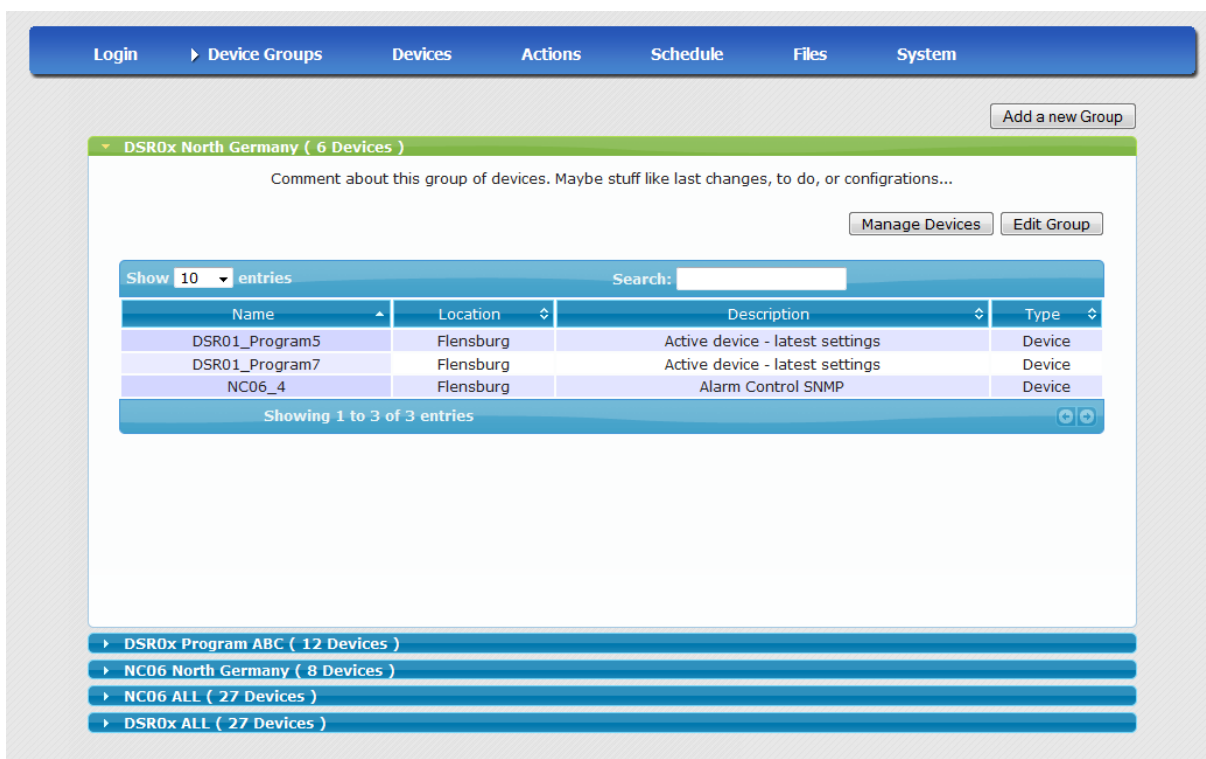


In this example all devices are scheduled to receive a firmware update for the ARM CPU, all DSR01s in group 2 to receive a DSP firmware update and all DSR02s to receive a FPGA firmware update. The firmware files can be distributed multiple times, to ensure corrects reception even in non optimal reception scenarios. The update process needs to be started using a second command, allowing for a scheduled update at the users choice of time.

Embedded Controller 01 (EC01)

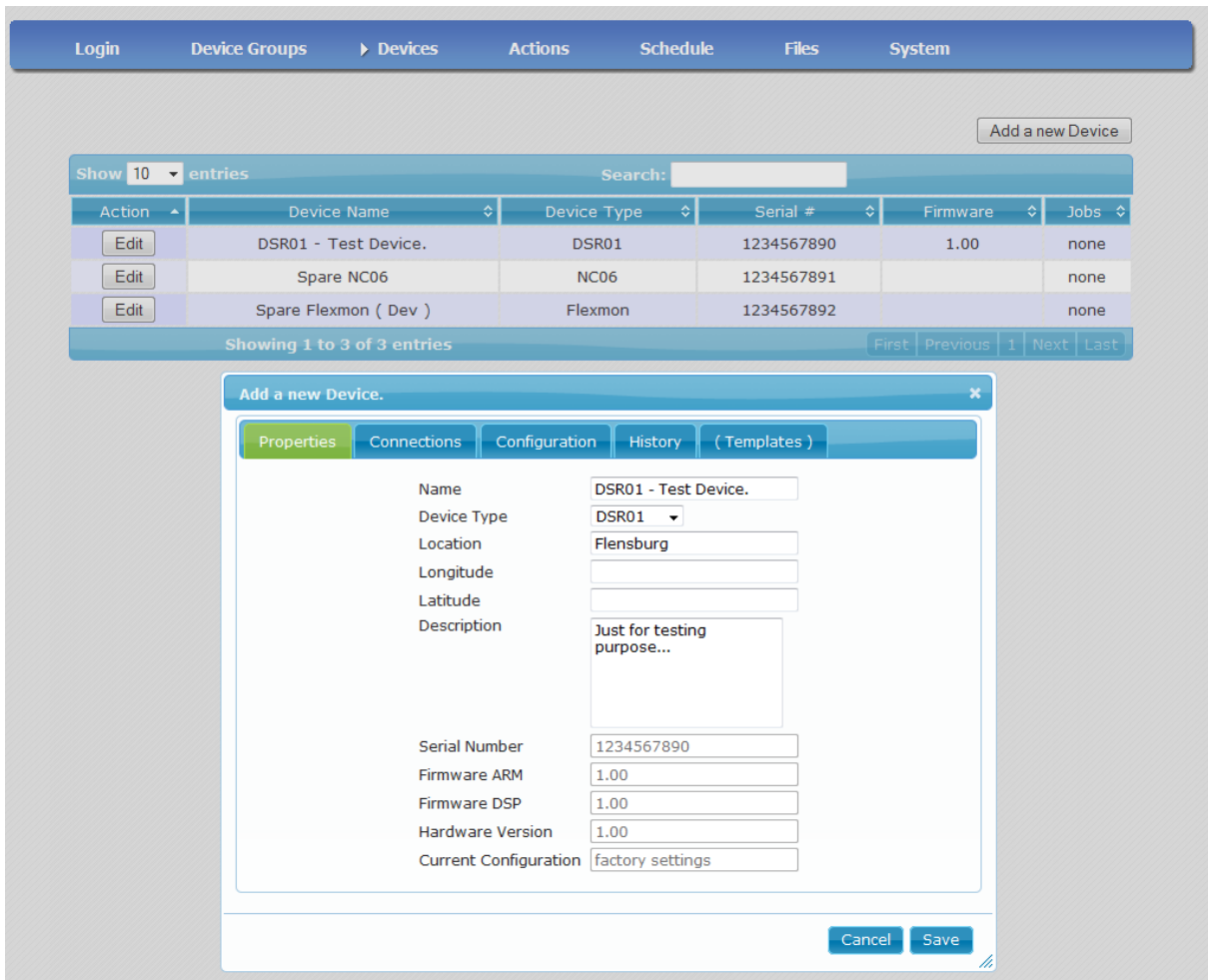
The Embedded Controller 01 or EC01 is at the heart of the SIRC system. The EC01 is a 19" HU device with no moving parts or fans. Its purpose is to prepare network control data that is later embedded in private or ancillary section in the transport stream, schedule and execute tasks and maintain the database containing the networks devices and their states (versions, tasks, settings, content of SD card, etc.). The EC01 is completely accessible via web interface so it can be accessed with a browser from any computer.

The following information is included to give the reader a first impression of the EC01. All of the pictures are actual screenshots of the EC01 web interface.*

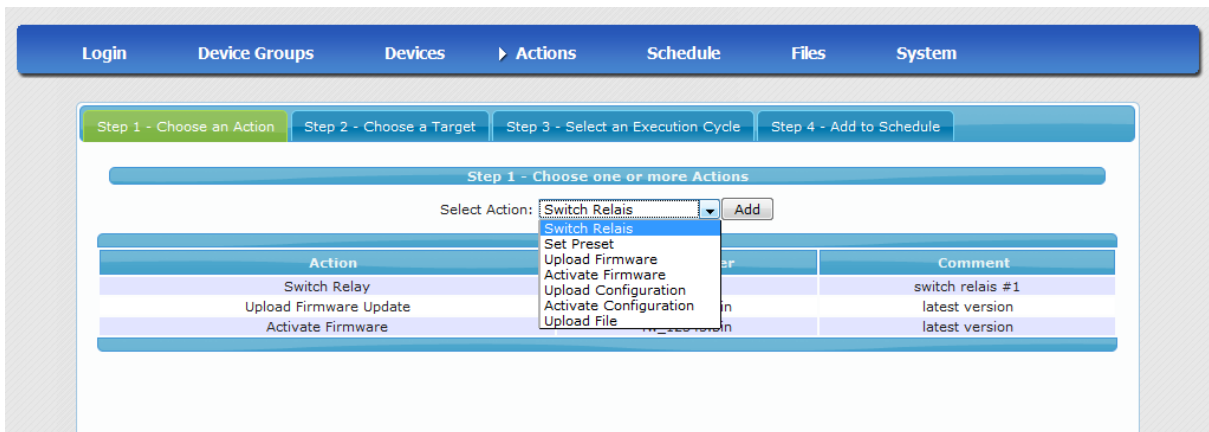


*All content on the pictures and descriptions are subject to change without notice.

The SIRC controllable devices are organized in the Device Groups menu. There devices can be added to or removed from groups, to easier organize the network. Devices can be members of multiple groups, for instance a DSR02 is most likely member of the group depicting the physical location, but also of the DSR02 group depicting all DSR02s in the network.



In the Devices menu devices can be added, removed or edited.



The Actions menu allows the user to plan, schedule and execute tasks for devices in the database, i.e. schedule a firmware update, switch a preset, etc.

Login Device Groups Devices Actions Schedule Files System				
Show 10 entries		Search:		
	Job Description	Est. Duration	State	Schedule
Cancel Job	Program1: Set Preset #1	1h 30min	75% done	*now*
Edit Job	Group firmware update tonight...	1h 30min	---	Today 23:00
Edit Job	NC06 Switch Relay #1	< 1min	---	Daily 22:30
View Job	Program1: Set Preset #2	< 1min	Success	done

Showing 1 to 4 of 4 entries [First](#) [Previous](#) [1](#) [Next](#) [Last](#)

The Schedule menu allows the user to review past, current and future tasks and edit or cancel them if the need arises.

Login Device Groups Devices Actions Schedule Files System				
Show 10 entries		Search:		
	Description	Name	Size	Type
Delete	Firmware DRS0x 1.3	dsr0x_1.3.bin	1.3MB	Firmware
Delete	Firmware DRS0x 1.4	dsr0x_1.4.bin	1.4MB	Firmware
Delete	Firmware NC06 2.3	nc06_2.3.bin	1.1MB	Firmware
Delete	Add Jingle Program1	add_jingle.mp3	1.5MB	Audio
Delete	News Jingle Program1	news_jingle.mp3	1.5MB	Audio
Delete	Common Configuration DSR0x 1.0	drs0x_config.cfg	350kb	Configuration

Showing 1 to 6 of 6 entries [First](#) [Previous](#) [1](#) [Next](#) [Last](#)

[Upload a new File](#)

The Files menu contains a list of all files in the database. All data files to be uploaded to devices via SIRC are stored in the database to ensure full availability and give users the ability to reuse files without having to upload them again each time.