Thanks to SCR: One single cable for up to eight receivers

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SCR is short for Satellite Channel Router and is a specification defined in the EN 50494 standard, which applies worldwide and which is the result of joined forces between several companies under the guidance of SES Astra. So what's in it for you?

The problem SCR addresses is as old as satellite reception: Satellite signals which reach the LNB are transmitted in the 10.7 to 12.75 GHz range and are then converted by the LNB to the 950 to 2150 MHz range for transmission to the receiver via a coax cable. This limited frequency range is not wide enough for covering the full frequency band of a satellite, which is why the signals broadcast via satellite are split up into four distinct ranges.

■ Ein SCR-taugliches LNB

On the one hand, we distinguish between low band and high band. The low band covers the range from 10.7 to 11.75 GHz and the high band goes from 11.8 to 12.75 GHz. Thanks to a 22 kHz control signal – which is modulated using the LNB supply voltage – receivers are able to tell the connected LNBs which band the selected channel is on (no control signal = low band; 22 kHz control signal = high band).

On the other hand, there are two different polarisations, namely horizontal and vertical, or left and right respectively. Switching between the two is controlled with the LNB supply voltage. If, for example, the receiver transmits 13 V to the LNB the LNB receives the vertical (or left) polarisation, while 18 V power means the LNB will pick up horizontal (or right) signals.

From this it follows that each tuner input requires a dedicated line all the way to the LNB or multi-switch. Otherwise, the receiver will not be able to receive signals from the complete frequency range. For argument's sake let's assume that two receivers are hooked up to the same coax cable. If receiver A requires a vertical signal and sends 13 V to the LNB while receiver B is looking for a horizontal signal and therefore transmits 18 V via the same cable then this would result in receiver B being prioritised as the higher voltage overrules the lower voltage with regard to the selected polarisation in the LNB. And with the 22 kHz control signal it's the same story.

So as far as satellite reception is concerned, it has been evident right from the beginning that signal distribution requires a substantial amount of planning and infrastructure. In the case of an apartment building, for instance, an individual coax cable has to be provided for each wall outlet from a central distribution point. Simply creating a cable ring that transmits signals from one outlet to the next (as is the case for terrestrial or cable TV distribution) just won't cut it for satellite signals.

Ring distribution by definition means that a single signal access is used to distribute signals from one wall outlet to the next, no matter how many of them you need to cover. Smart planning and a signal amplifier here and there thus are all that is required to connect dozens of apartments to cable TV.

If you're building your own house it is of course not too difficult to make it satellite television compatible right from the start by creating a network of coax cables to each room from a central access point. But what if the house is already built or you've just moved into a new apartment? In most

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cases, basic cabling will be available, but how can you best use it for satellite reception, and how can you use your twin tuner receiver if only one cable leads to the wall outlet in the living room?

Global Invacom's optical LNB, which has been available for a short while now, is one possible solution. And then there's SCR.

How does SCR work?

In general, SCR comes in two different varieties: The first one has all control technology built right into the LNB, which means no additional equipment other than SCR-compatible receivers is required. The second variant is more complex and only works with SCR-compatible multi-switches and distributors, yet offers a vast variety of different set-ups and establishes an extremely versatile system.

With SCR, each active receiver is allocated a specific frequency range out of an overall range from 1200 to 2100 MHz. Up to eight receivers per cable can be accommodated according to current SRC specifications which define the following:

Four bands (high low)/polarisations (horizontal/vertical) are transmitted from the LNB in the 950 to 2150 MHz range. What an SCR LNB or multi-switch now does is wait for requests for certain transponders sent out by connected receivers. These requests are generated as soon as a user selects a new channel on their remote control.

Such a request is then checked by the controller in the SCR component and next the selected transponder is modulated to the allocated frequency. With this set-up each receiver invariably only receives the transponder it currently needs for the selected channel.

If an SCR multi-switch is used, it takes care of frequency allocation instead of the LNB. Alternatively, the overall system can also be set-up manually. Existing DiSEqC protocols are used for all communication between receiver and multi-switch and in case of automatic set-up each receiver sends a sign-on signal to the multi-switch as soon as it is turned on so that the multi-switch can allocate an available frequency range to this specific receiver.

The SCR system is not equipped with a return channel and can only reply with an HF burst, which means the receiver keeps requesting one frequency range after the other until the multi-switch confirms a set range.

The following sequence of events takes place every time a user chooses to watch a new channel: The receiver requests a certain transponder, and this request is sent to the multi-switch's SCR component, which in turn is responsible for each of the up to eight signal outputs. The SCR component analyses the request and then modulates the requested transponder to the frequency that was allocated to the requesting receiver during sign-on. The multi-switch also features a built-in controller which supervises the complete process, verifies correct execution and interprets all incoming DiSEqC commands.

One of the huge advantages of using an SCR multi-switch is the possibility of creating a mixed system. This means that in an apartment building, for instance, four coax cables with signals from a quattro LNB may be distributed to each floor, from where the individual apartments are connected with a single line from a central SCR multi-switch on each floor. This single line can be designed like a ring leading from the living room to the children's bedrooms and so on, with all channels being available independently from each wall outlet.

There even exists an SCR scenario which allows distributing signals from two different satellites. In such a matrix, up to eight users can receive signals from two different satellites using a single ring-like cabling. What is decisive in any ring set-up is that each ring has to be equipped with a terminator resistor with capacitive separation. However, this is a requirement for all ring distributions, irrespective of whether we're talking about satellite or cable TV.

It is also noteworthy that SCR multi-switches also allow feeding in terrestrial signals and making them available to all users via the same single coax cable.

Let's go back now to the other variety described above, which is using an LNB with integrated SCR technology. While it may save money initially it comes with strings attached – only one satellite can be received and the set-up cannot be cascaded and expanded in future.

With this variety all four reception ranges (low band horizontal, low band vertical, high band horizontal, high band vertical) are converted to the satellite IF right in the LNB, with a built-in multi-switch receiving requests from connected receivers. The respective signals are then forwarded to the individual receivers by SCR components included in the LNB.

Are all receivers SCR-compatible?

SCR is a technology that extends far beyond DiSEqC protocols 1.0, 1.1 and 1.3, which means that only few receivers can deal with SCR distribution equipment.

SCR and pay TV

The development in recent months has illustrated that pay TV providers (such as Sky Italia, for example) are showing great interest in SCR technology. It is particular pay TV platforms which provide customers with proprietary receivers that are joining the bandwagon. Why is that? Most providers these days offer twin tuner receivers, while most customers only have a single cable leading to the living room wall outlet. Thanks to SCR all that needs to be done is exchange the conventional LNB for a new SCR LNB and update the receiver's firmware so that it becomes SCR-compatible as well. After that the existing single cable will provide two completely independent tuner inputs and any twin tuner receiver can be used to the full. There's no better and cheaper way for such an upgrade.

The future of SCR

While delivering excellent results with state-of-the-art equipment and professional installation, SCR technology nonetheless looks a bit dated in comparison with Global Invacom's optical LNB technology. So we can expect SCR to be around for a few more years, especially for solving the problem of a missing second cable for twin tuner use, but in the long run Global Invacom's optical LNB will be the winner. While offering a considerable improvement over traditional set-ups, large-scale signal distribution with SCR is still far more difficult to achieve than with optical distribution, which only requires an extremely thin cable for simultaneously carrying the complete frequency range of a satellite.