

FORWARD PATH HEADEND SIGNAL ORGANIZATION

BACKGROUND

Doing away the local headend stations of the smaller service areas, centralizing the headend roles into larger centers fronts the CATV service providers with new and difficult problems. They have to ensure that the broadcast channels and the network management carriers reach all the optical segments; that the number of the subscribers connected to a CMTS port or to a VoD purpose edge QAM fall short of the maximal allowed value in order to provide a quality service; further that the regional and local TV channels appear only in the segments, where they are interesting. So realizing connections between each individual signal sources and optical transmitters needs a difficult signal organizing network, which must be clear-cut in order to achieve easy usage and must have low power consumption in order to minimize OPEX. To achieve the above described object Comtech Ltd. has developed the HRF-D integrated signal organizer product family.

THE COMTECH SOLUTION

By the suitable cascading of the 3 elements of the product family - the HRF-D1 driving combiner, the HRF-D2 level matching combiner (figure 1) and the HRF-PS redundant, switching mode, dual power supply - minimum 8 and maximum 512 inputs of optical transmitters can be driven with optimal level signals; respectively further signals can be added to the combined spectrum of the edge QAM devices or regular modulators on minimum 2 and maximum 4 hierarchical levels.

The upper hierarchical level concerns the inputs of all the optical transmitters, so the modulators of widely popular regional channels, the element management gateways (HMTS) and the measuring purpose sweep sources can be connected to this level. The middle hierarchical levels reach a lower number of transmitters (a group of segments) depending on the composition of the cascade, so the VoD and SDV purpose edge QAM devices should be placed here. At the lower hierarchical level all the segments are available separately and independently in order to allow flexible connecting surface for the CMTS ports and modulators of local TV channels.

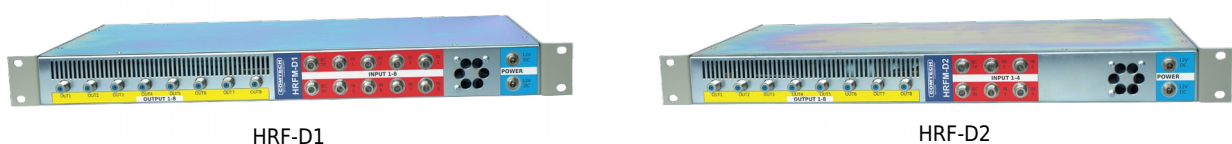


Figure 1

SERVING 8 SEGMENTS

The HRF-D2 element of the family can serve 8 segments by itself. In this case the CATV spectrum containing only the broadcast TV channels has to arrive at the broadcast input with a level of 95 dBuV per channel (referred to analog carrier). Above this the device is able to receive two groups of narrowcast signals. The first group (the upper hierarchical level) appears at all the 8 outputs, while the second group (the lower hierarchical level) appears only at a particular output. All the hierarchical levels have 4 inputs, which can be driven by a signal level of 108 dBuV (figure 2).

The HRF-D2 has 8 outputs, all of them provide a signal level of 80 dBuV per channel (referred to analog carrier), so it ensures an optimal modulation index at the output of the optical transmitters.

In case of serving 8 segments 1 piece of HRF-D2 signal organizer and 1 piece of HRF-PS power supply are needed, so the space requirement of the solution is 2 U in the cabinet.

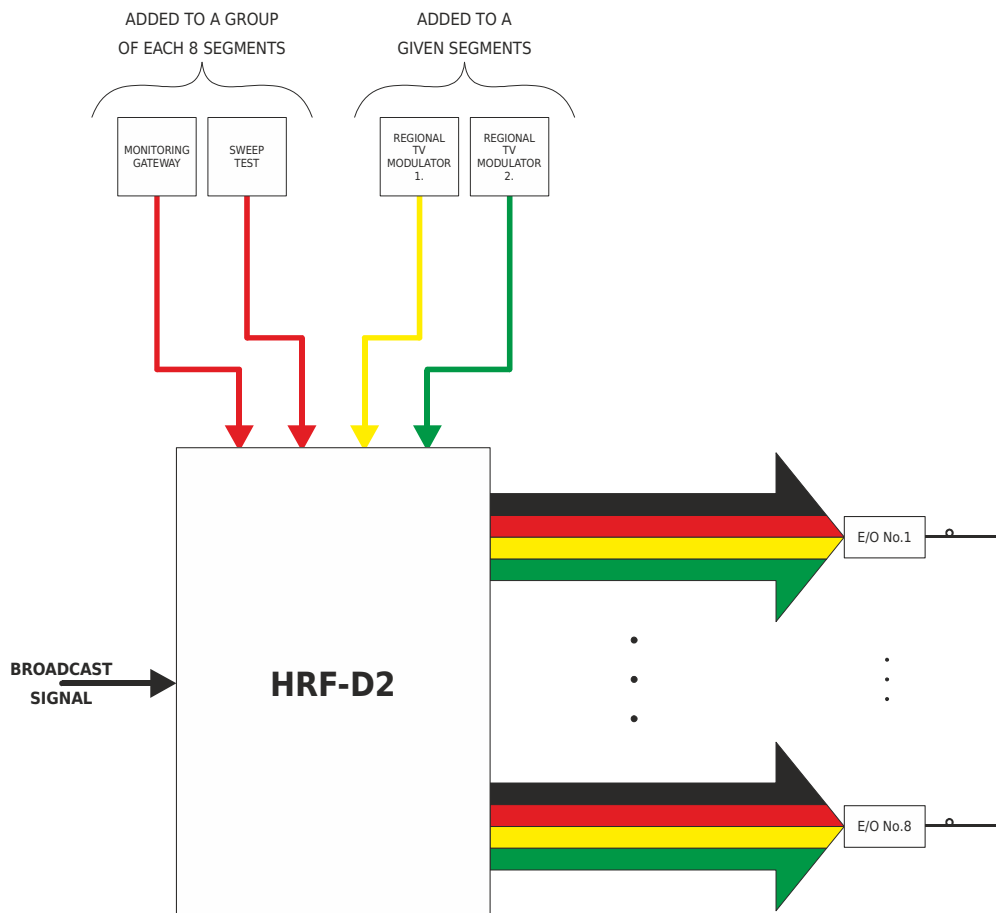


Figure 2

SERVING 64 SEGMENTS

If more than 8 segments have to be served, more HRF-D2 devices have to be used, they will be driven by a HRF-D1. The HRF-D1 (like HRF-D2) needs a signal level of 95 dBuV per channel at the broadcast input, while its outputs are working not with levels required by transmitters, but with levels required by the HRF-D2, i.e. they will provide the same level of 95 dBuV as arrives at the input. The HRF-D1 has 8 outputs and 8 narrowcast inputs with prescribed signal levels of 108 dBuV. The signals of the sources connected to them appear at all the outputs.

If all the outputs of the HRF-D1 an HRF-D2 is connected to, a signal organizing network draws up with same level relations as in case of serving 8 segments, but the number of the system outputs (the servable segments) will be 64, the number of the hierarchical levels will be 3. The signals of the upper level appear in all the 64 segments, the signals of the middle level appear in a group of 8 segments, while the signals of the lower level appear only in a particular segment (figure 3).

In case of serving 64 segments 1 piece of HRF-D1 and 8 pieces of HRF-D2 signal organizers, as well as 1 piece of HRF-PS power supply are needed, so the space requirement of the solution is 10 U in the cabinet.

(In case of serving lower number of segments lower number of HRF-D2 devices are needed, i.e. in case of 32 segments 1 piece of HRF-D1, 4 pieces of HRF-D2 and 1 piece of HRF-PS are needed.)

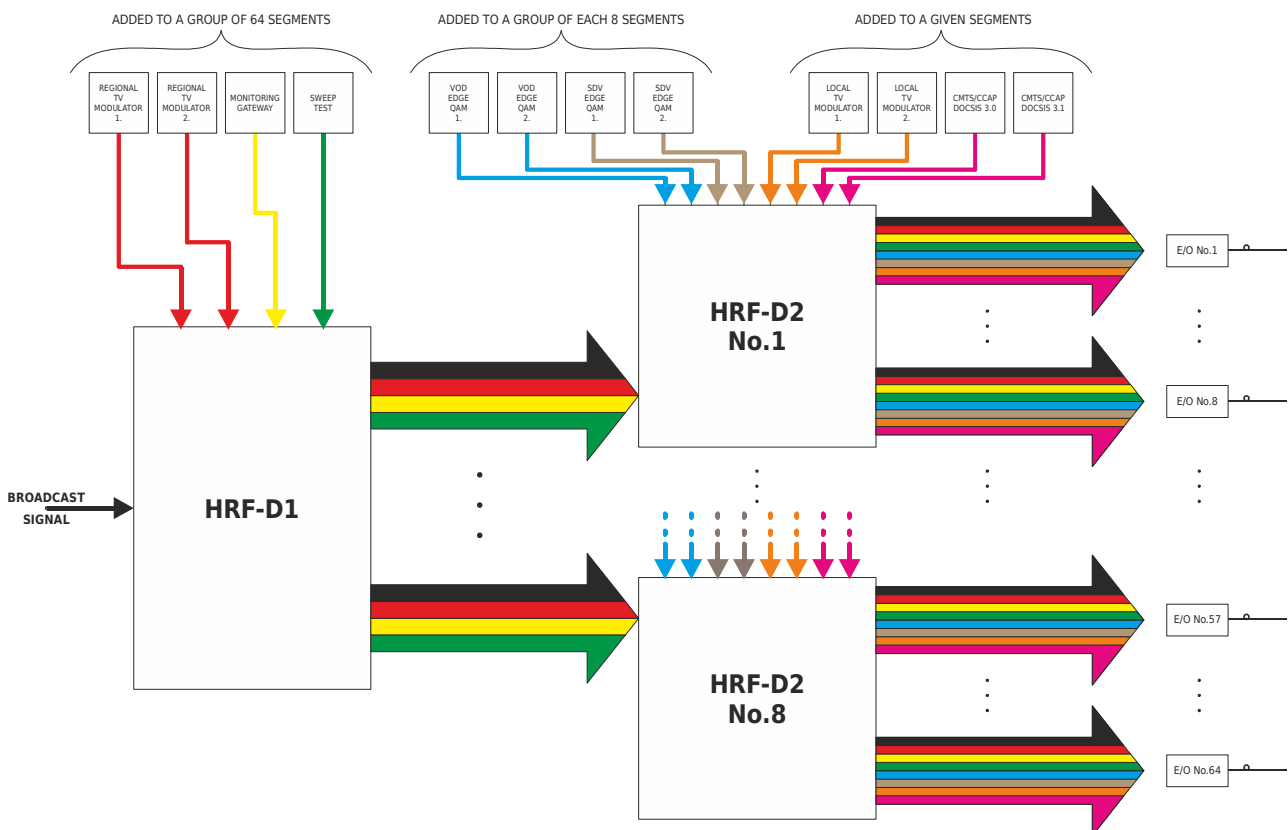


Figure 3

SERVING 512 SEGMENTS

Since the HRF-D1 does not modify the levels of a spectrum, the above described solution can be extended with a new level: a whole signal organizing system for serving 64 segments can be connected to all the outputs of a further HRF-D1, so serving maximum 512 optical transmitters is possible. The system contains 4 hierarchical levels, they add narrowcast channels to 512, 64, 8 and 1 segments respectively.

In case of serving 512 segments 9 pieces of HRF-D1 and 64 pieces of HRF-D2 signal organizers, as well as 8 pieces of HRF-PS power supply are needed, so the space requirement of the solution is 81 U in the cabinet.

USE, ALIGNMENT

The elements of the product family have a construction, that is able to receive signal levels, which are in the output level range of the RF headend devices. If this condition is fulfilled, the output will automatically provide levels, which are expected at the input of the optical transmitters, so the devices do not need alignment (figure 4).

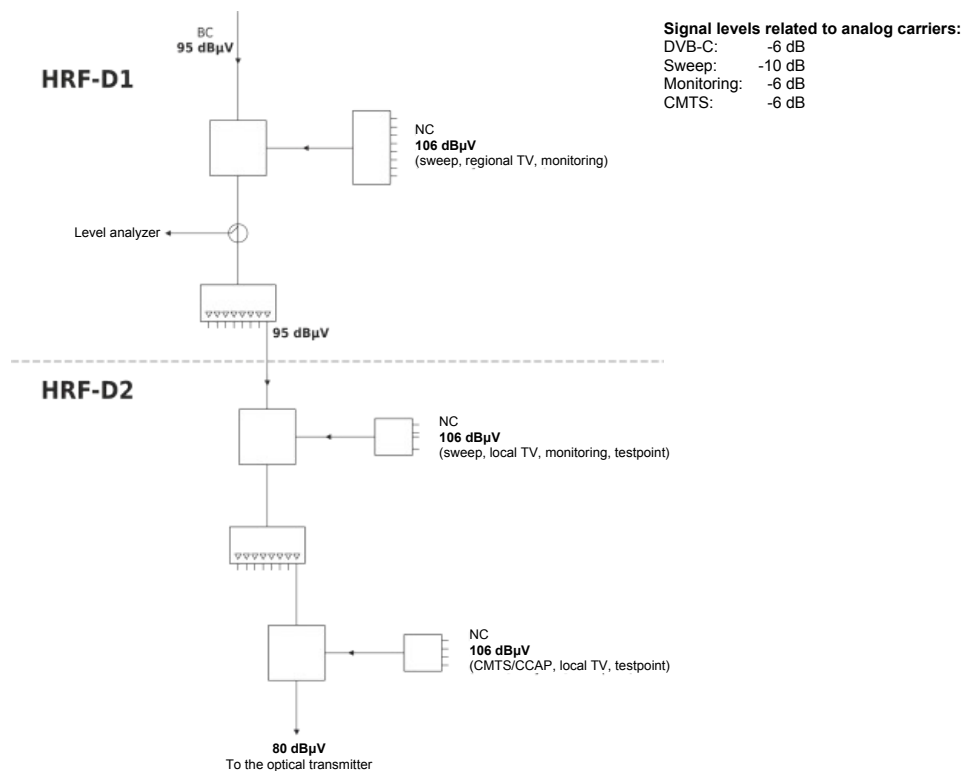


Figure 4.

The most space-saving construction required to place connections both on the front and rear side of the device. This makes possible to group the broadcast inputs and outputs to one side and narrowcast inputs on the other side, so the cabling of the headend can be more clear-cut.

POWERING OF THE SYSTEM

The system is powered by a separate power supply HRF-PS (figure 5). The device contains two independent 12 V/12 A switching mode power supplies for a redundant work. The device is designed for serving 1 piece of HRF-D1 and 8 pieces of HRF-D2 with a power reserve of about 30%. The powering voltage is delivered to each devices by a flexible powering track, which is delivered with the HRF-PS unit.



Figure 5.

KEY BENEFITS OF OUR SOLUTION

- **Very low space requirements** (1 U + PSU for 8 segments, 9 U + PSU for 64 segments, 81 U + PSU for 512 segments)
- **Low power consumption**
- **Flexible use** (high number of various devices can be connected to an arbitrary number of optical segments)
- **No or only a little external cabling is needed**
- **No alignment is needed**
- **Flexible mechanics** (front and rear plate are interchangeable by adequate montage of mounting handles)