The SAFE-1000 have automatic Level control features which permits acceptance of a wide range of signal levels.

The Head-End "Direct Connect" Unit is hardwired to a base station radio or other radio signal source. A 50ohm RF cable is used to connect the signal source and the Head-End Downlink Card

Each plug-in card of the SAFE-1010 accepts a <u>single carrier frequency.</u>

Each Card is designated as to the specific range of frequencies it can accept:
-700 MHz band
-800 MHz band
-UHF band
-VHF band
-900MHz band

Some cards can accept multiple ranges. Refer to product labels and factory test data to confirm.

Although a card can accept a wide range of frequencies, it is designed to operate with only one modulated RF carrier per card. Inputting 2 or more carriers per card can lead to damage and the performance will not meet specifications and cause interference with other operating bands. .

The acceptable RF input power range per card = -6dBm to +10 dBm

Important : Only one frequency is to be inserted into each Card. Each card is a single channel module.

Figure 2 demonstrates a 4 channel system. Each radio channel is tapped at the individual radio TX output from the base-station.

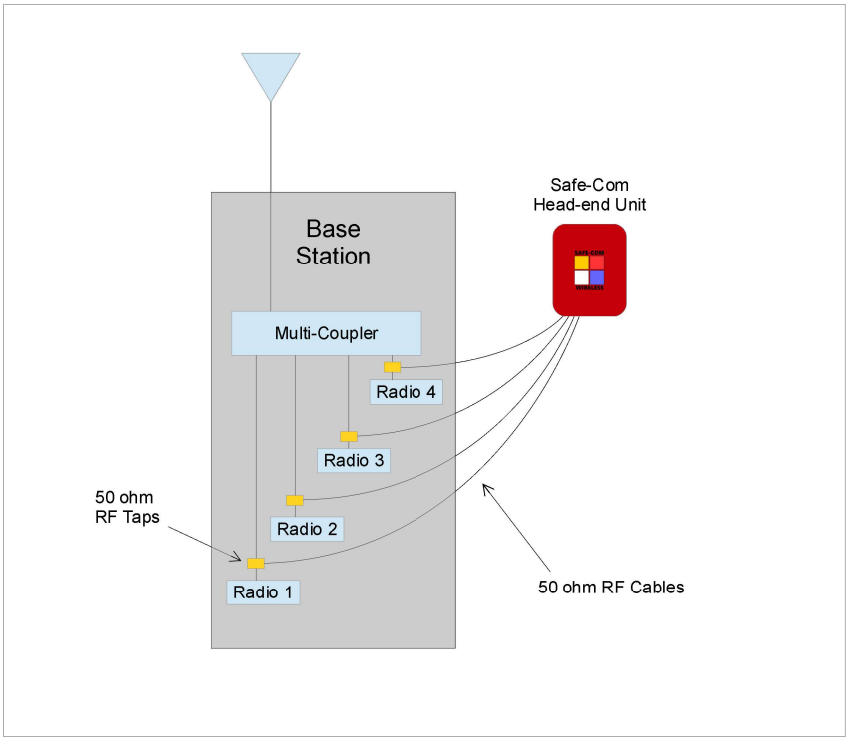


Figure 2

The RF input into each Card of the Safe-Com Head-End DAS must be within **+10dBm to -6 dBm**.

Within this range the Safe-Com Head-end will automatically compensate and adjust the level for optimal drive into the fiber distributed system.
Example: Radio TX Level = 10 watts (40dBm), Select 40dB tap, RF input into Head-end Card = 0dBm

A signal below this range will not drive the fiber DAS properly causing low CNR.
A signal above this level may damage the equipment.

Card System

The Safe-Com DAS is a "Opto-channelized" system. This means the individual RF carriers are transported independently minimizing the opportunity to interfere with each other. Each plug-in card on the down-link carries a single RF channel.

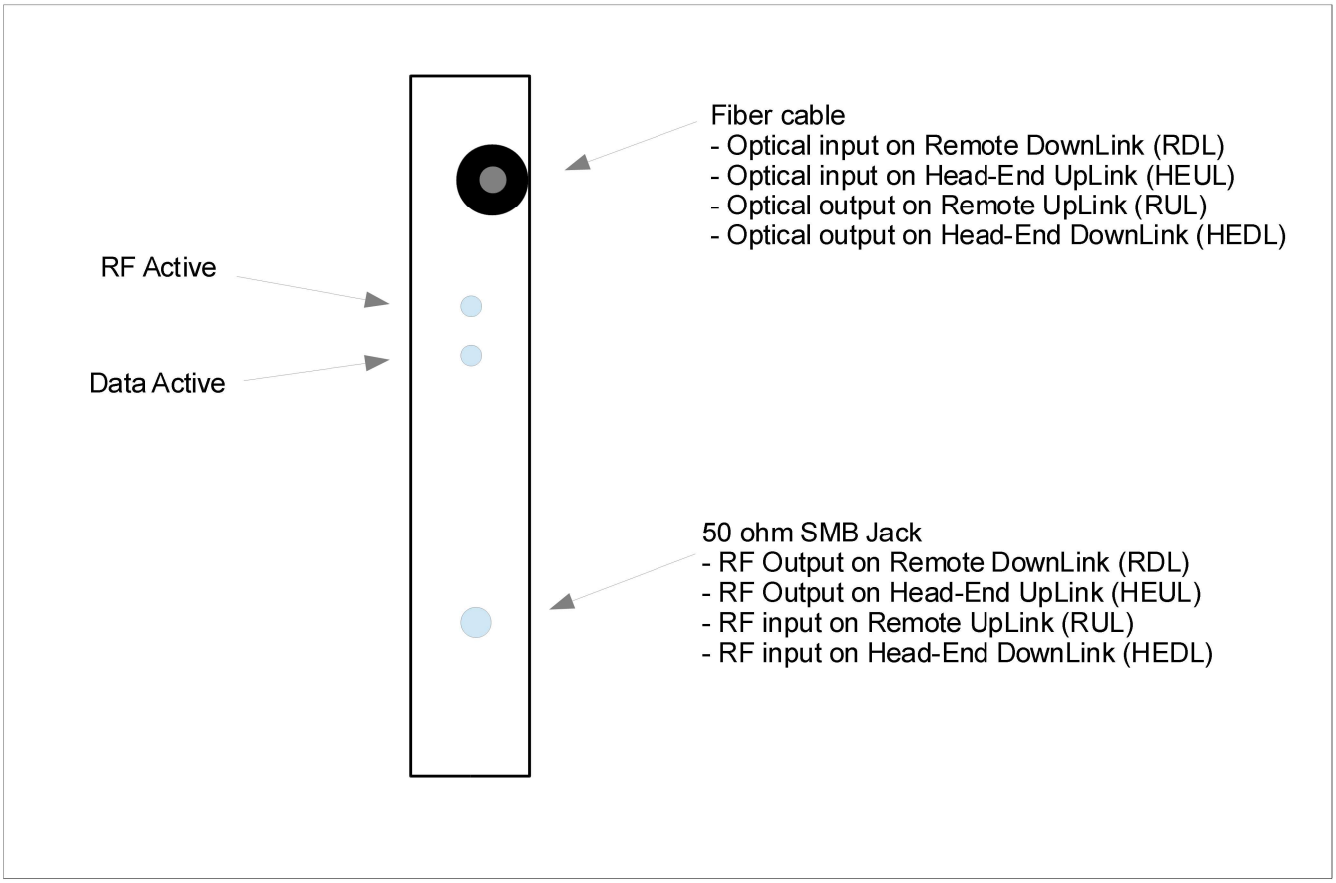
There are two types of cards:

> Downlink Cards – these cards carry the signal from the base station to the remote units (and towards the mobile radio user) .

> Uplink Cards – these cards carry the signal transmitted by the users mobile radio, received at the remote unit and transported by fiber to the head-end and its connected base-station.

A short pigtail with an SC/APC connector provides the optical interface.

A 50 ohm SMB jack provides the RF interface. It is located on the front panel of each individual plug-in card.



Warning: Class 1 laser. Do not stare into fiber connector .

The RUL (Remote UpLink) and HEDL (Head-End DownLink) Cards have an optical output.

Connecting the fiber

The SAFE-1000 uses singlemode fiber to connect the head-end with the remote Units.
Up to four remote units can be used with each Head-end.
Multiple Head-ends can be added to expand the

SC/APC are the standard connectors used. They use an 8 degree polish angle.

The number of fibers required for each remote depends on the Fiber Configuration of your system.
The number of fiber connections inside the Head-end Unit depends on the Topology of your system.
Inside the Head-end unit one will find four Green SC/APC adapter ports.

Topology – Star: Each Remote requires a dedicated home run connection directly back to the Head-end
Fiber Configuration – Dual: Each Remote uses 2 fibers. One for uplink and one for downlink

Number of fiber connectors at Head-End: Eight (8)
Number of fiber connectors at Remote: Two (2)

Topology - Star: Each Remote requires a Home run connection directly back to the Head-end

Fiber Configuration - Single: Each Remote uses 1 fiber. Uplink and Downlink are optically multiplexed onto the same fiber strand.

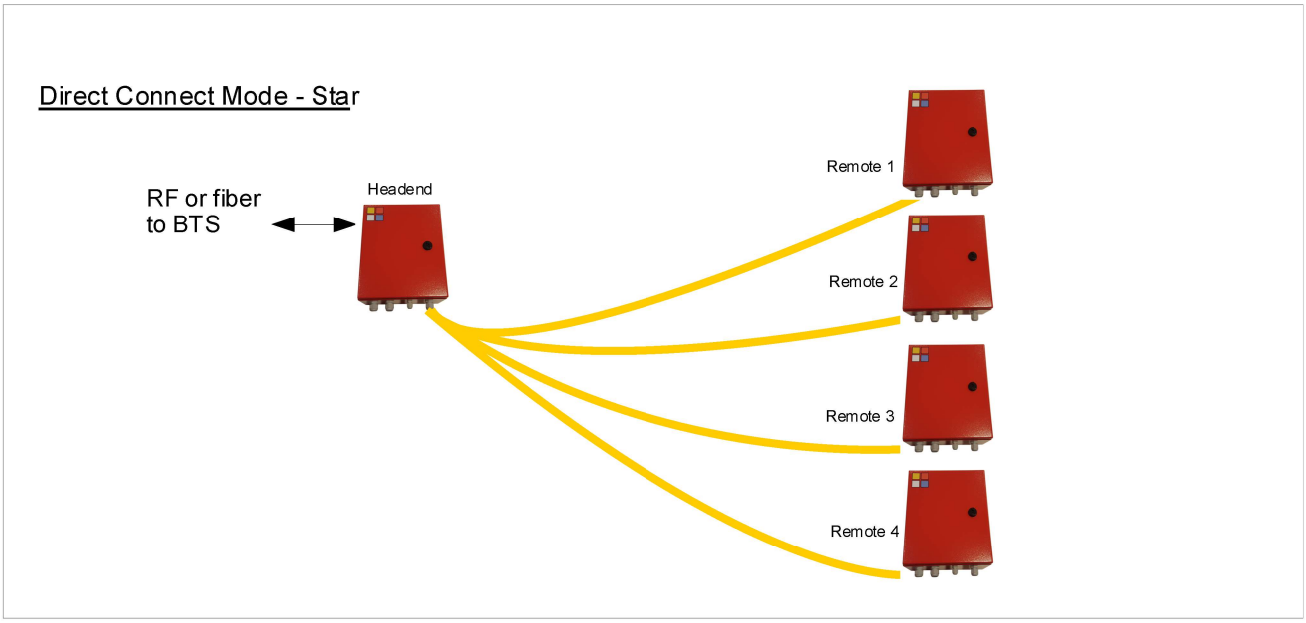
Number of fiber connectors at Head-End: Four (4)
Number of fiber connectors at Remote: One (1)

Topology - Linear: The fiber hops from Head-end to each Remote in a linear daisy chain. No need to run each Remote to the Head-end.
Fiber Configuration - Dual: Each Remote uses 2 fibers. One for uplink and one for downlink same fiber strand.

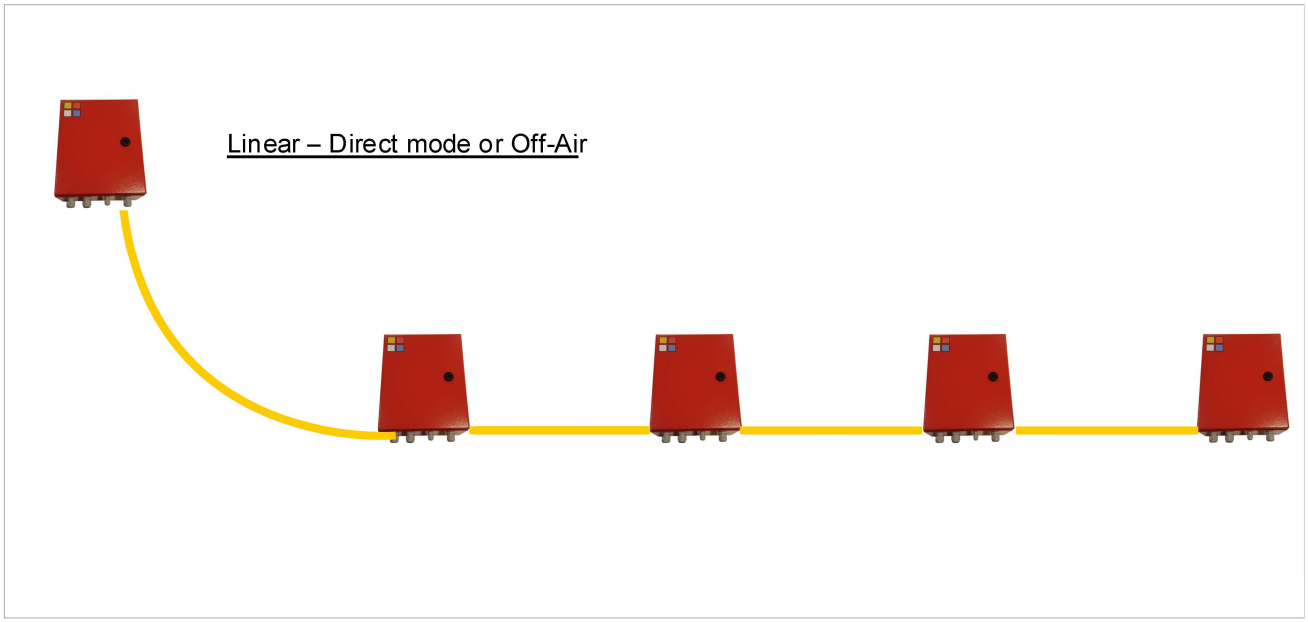
Number of fiber connectors at Head-End: Two (2)

Topology - Linear: The fiber hops from Head-end to each Remote in a linear daisy chain. No need to run each Remote to the Head-end.
Fiber Configuration - Single: Each Remote uses 1 fiber. Uplink and Downlink are optically multiplexed onto the same fiber strand.

Number of fiber connectors at Head-End: One (1)
Number of fiber connectors at Remote: Two (2) except the last Remote which has one (1)
Maximum Optical Loss: The System can easily handle up to 5dBo of optical loss between Head-end and any Remote. Beyond 5dBo, the System CNR may degrade.



Number of fibers to each remote depends on "Fiber Configuration described above.

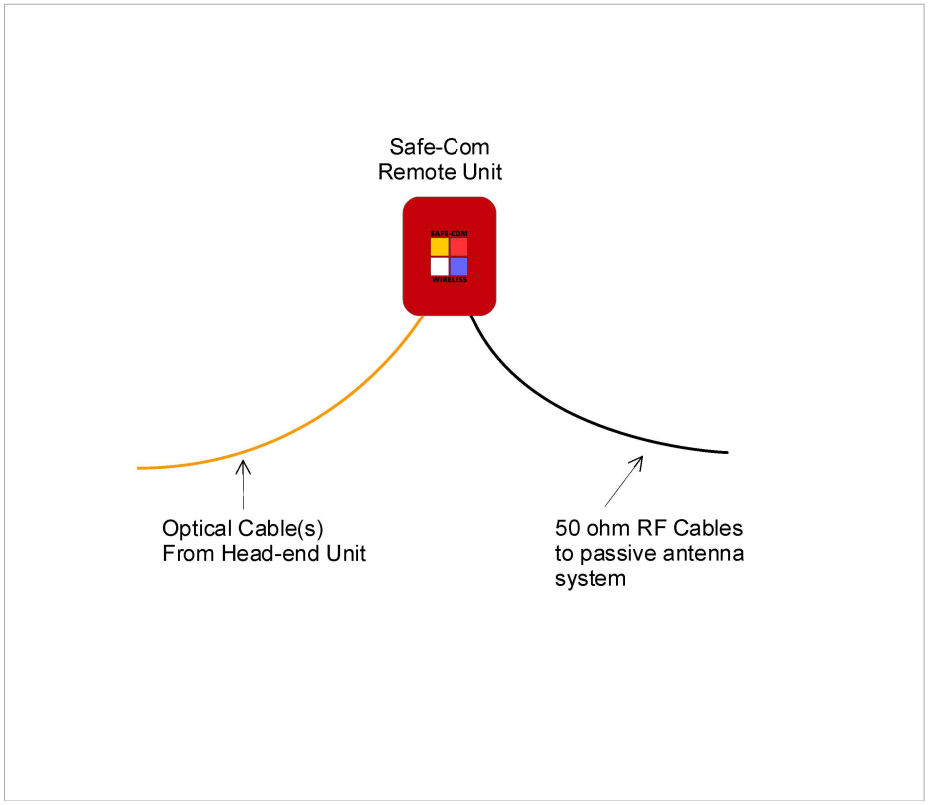


Setting up the Remote Unit

The Remote Unit accepts bidirectional optical signal via single mode fiber from the Head-End Unit.
It converts the optical signals to RF – radio frequency.
The RF is interfaced with a distributed antenna system consisting of antenna and splitters and taps.

The Remote Unit monitors the incoming signal ad assures proper levels so as to guarantee the radiated emissions downlink do not exceed FCC limits.

On the uplink provides a fixed gain level, but the system does monitors the incoming signal and attenuates when excessive signal is detected at the uplink input port. This is to prevent damage to the internal circuitry. Excessive RF input can still damage the unit so care should be take not to key up radios or cellphone near the unit, especially during installation process. .



Setting up the Downlink at the Remote

The SAFE-1000 has automatic Level control features which controls the downlink radiated RF output power at the Remote and assures the maximum FCC limits are never exceeded under normal operating conditions.

The System will tolerate a direct fiber connection (i.e. a short 1 meter fiber) between the Safe-Com Head-end and the Safe-Com Remote Unit without exceeding RF output levels.

Note: Never connect another manufacturers DAS or BDA equipment to the Safe-Com System. Performance is unpredictable, it can damage the equipment and it will exceed FCC operating limits causing interference to other public safety or commercial system operations.

Power up the unit with the appropriate power source (110 / 220VAC 50/60HZ, +9VDC, +12VDC, -48VDC)

Connect the SC/APC connectors to the Remote unit. The number of connectors will depend on the Topology and Fiber Configuration of your System. Use normal good practices in handling fiber and fiber connectors. Clean the fiber tips before connecting.

The individual Card RF outputs are combined into a single multip port output.

An optional duplexer, if included, combines uplink and downlink channels.

If a duplexer is not included, two antennas will be used: one for uplink and the second for downlink.

Antenna separation of 30 feet minimum is required between uplink and downlink antenna.

Specifications

Parameter	Value
Output Power UL / DL	1 watt per band maximum 18 to 30dBm per channel typical
Input Power UL / DL	+10dBm max uplink (at Remote UNit) 1 watt max downlink (at Head-End Unit)
Gain UL / DL	30 dB minimum (direct connect version)
Noise Figure	<9 dB
Spurious	Per FCC
Rejection	Per FCC
Gain Control	30dB / 0.5dB steps
Optical Loss (SMF SC/APC)	5dBo "Standard" / 10dBo "Extra"
Power	55 watts avg. at 10 channels, 65 watts peak
Size	12 x 10 x 6 inches Head-end / Remote / 24 hour battery
Temperature	-10 to +60 deg C

Power / Mechanical

Power Supply	85-240 VAC or 12 VDC or -48 VDC
Power Consumption	<65 watts maximum peak, 55 watts avg.
Size	300 x 250mm wall footprint, 150mm deep
Enclosure	NEMA 4, IP65

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