

# Basics of TV/Sat Distribution

## What is TV/Sat Signal Distribution?

Traditional TV signal distribution is how TV & Satellite RF (Radio Frequency) signals can be distributed around a building or campus to serve multiple points or users.

In a standard house, the distribution system might simply be a single coax cable connecting the TV aerial or Satellite dish on the roof to the TV outlet behind the TV set. In a residential block or large office, the distribution system will be a complex network of cables and RF amplifiers, splitters, switches and other equipment.

Other methods for distributing TV are IP (stream TV signals over a LAN network – typically used in offices) or HDMI (used within the home to distribute TV signals between equipment and sometimes between rooms).

## What is an IRS?

IRS stands for 'Integrated Reception System'. An IRS collects RF signals (carrying TV, Satellite and Radio) from one or a small number of aerials and satellite dishes and distributes these signals to a number of locations, such as different apartments or offices.

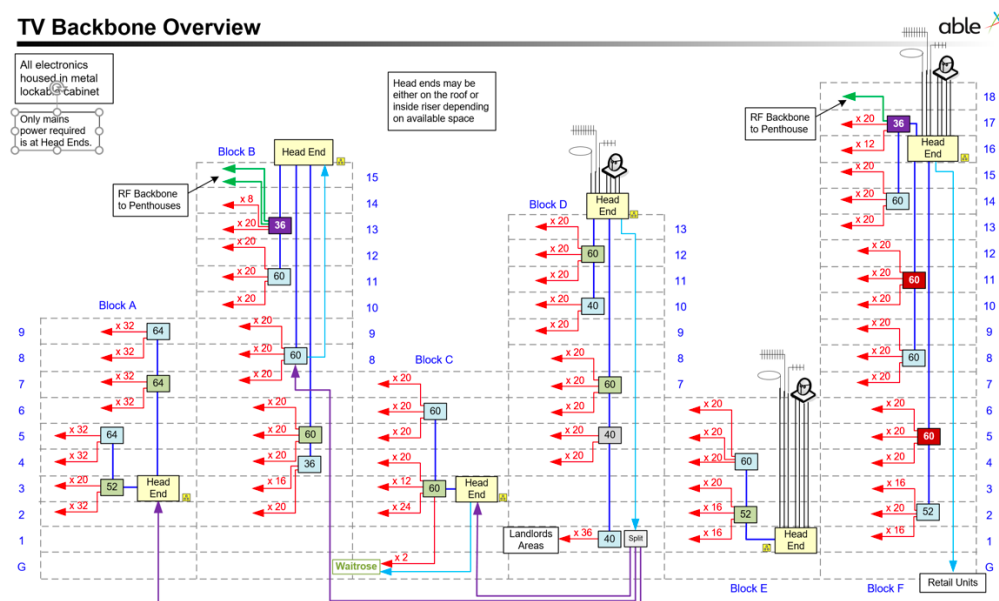
Most IRS's will provide signals for Terrestrial TV (Freeview), DABs/VHF Radio and Astra 28.2 Satellite (used by Sky and freeSat). Some will also provide signals for additional satellites such as HotBird.

An IRS can cover anything from a few flats to an entire village or office block. Most modern residential blocks will have an IRS.

The big advantage of an IRS, compared with each subscriber having their own TV aerials and dishes, is that it is tidy, with no unsightly proliferation of TV aerials and satellite dishes all over the building.

A typical IRS utilises electronic equipment called multiswitches, located in the risers or external cabinets. These multiswitches provide signals to the dwellings through coax cables.

## TV Backbone Overview



## What is MATV?

MATV stands for Master Antenna TV. MATV is the same as IRS except that it only distributes TV and Radio signals – not satellite.

For technical reasons, it is easier to build a MATV system than it is an IRS. If satellite isn't required, a MATV system may be a more attractive cost-effective alternative.

## What is SMATV?

SMATV stands for Satellite Master Antenna TV. SMATV is the same as MATV in that it only distributes TV (UHF) and Radio signals. The difference is that it will also include facilities at its headend to decode selected satellite channels which are distributed as additional TV channels.

SMATV systems are typically employed in Hotels, Gyms and similar locations where the TV receiving equipment can be centrally managed.

## What is the difference between SMATV and IRS?

Both IRS and SMATV systems will distribute off air TV and Radio channels to multiple subscribers.

However, a SMATV system will only distribute selected satellite channels at UHF frequency. In comparison, an IRS will distribute the raw satellite frequency signals to all subscribers, so any user with their own satellite receiver equipment (such as a Sky box or freesat receiver) can receive any channel of their choosing.

The advantage of SMATV is that the user's reception equipment is simple. For example, if many subscribers would like to watch a popular sports channel, that channel can be incorporated into a SMATV headend and then any user with a standard TV can receive it. They do not need a satellite receiver or viewing card. However, the headband can be complex, subscriptions to pay TV channels have to be centrally managed and the number of available channels is always restrictive.

The advantage of an IRS is that it is more general purpose and there the only restriction on channels are the signals which the system is receiving. However, to enjoy the full breadth of channels, the subscriber will require their own reception equipment, such as a satellite receiver.

A SMATV system is generally only applicable for centrally managed facilities such as Hotels and Sports Centres. Even in these areas, the emergence of digital TV and IPTV means that SMATV is being superseded by newer technologies.

## What is a FIRS?

FIRS is Fibre IRS or Fibre Integrated Reception System. A FIRS provides the same functionality as an IRS, except that the underlying technology uses fibre cable rather than copper coax cable to distribute the signals.



By Deenida

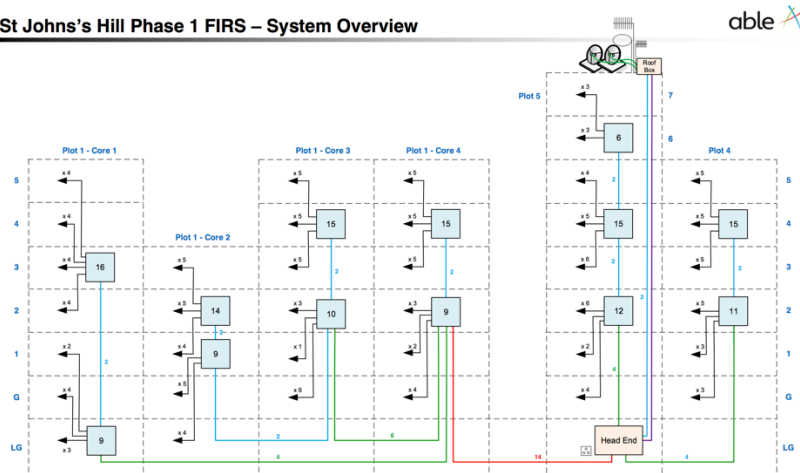
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network optical fiber cables and hub

The traditional IRS uses electronic equipment such as amplifiers and multi-switches to distribute the TV and Satellite signals over coaxial copper cabling. A FIRS distributes the TV and Satellite signals over optical fibre, using passive optical splitters to share the signals around the site.

The term FIRS normally implies that the fibre extends to each dwelling (FTTH) where there will be a fibre decoder to translate the signals back to coax for internal distribution within the dwelling.

#### St Johns's Hill Phase 1 FIRS – System Overview



## Coax (IRS) or Fibre (FIRS)?

So which system is best?

Advantages of Coax (IRS)	Advantages of Fibre (FIRS)
<ul style="list-style-type: none"> <li>• Cost. A coaxial system will typically cost less than the fibre equivalent. Although the distribution equipment and cabling of a FIRS is less expensive, this is outweighed by the cost of the fibre decoder equipment required in each dwelling.</li> </ul>	<ul style="list-style-type: none"> <li>• Transmission distance. Fibre allows RF signals to be transmitted over much longer distances. Using a traditional copper coax cable, due to signals losses through the cable, satellite signals need to be re-amplified every 100 -150 metres, depending on the signal frequency and cable type. However fibre cable can carry RF signals over several kilometres.</li> </ul>
<ul style="list-style-type: none"> <li>• Space in the dwelling. A coax outlet can be cables directly from equipment in the building</li> </ul>	<ul style="list-style-type: none"> <li>• Less cable. Fibre is much more efficient medium than coax cable. For example, a 4 x satellite backbone will run on a single 4-core fibre cable as opposed to seventeen</li> </ul>

services riser. A fibre system will always require at least a fibre decoder in each dwelling, typically located in the utility room or cupboard.	coax cables. This can represent a massive saving in cables costs, installation costs and use of space.
	<ul style="list-style-type: none"> <li>• Reliability. A FIRS is more reliable than the IRS equivalent. This is because after the headend, the FIRS is normally all passive. So, there is little to go wrong or require maintaining. [This does not take account of the FIRS optical decoder equipment in dwellings, which do require maintaining].</li> </ul>
	<ul style="list-style-type: none"> <li>• Convergence. Driven by the demand for high speed internet in the home, there is an increasing focus on connecting fibre directly into the homes. The TV fibre cable may also be used to carry data signals.</li> </ul>
	<ul style="list-style-type: none"> <li>• Flexibility &amp; Expandability. In a FIRS, each dwelling receives the full set of signals. Therefore, the resident has complete flexibility as to how they use them internally. In comparison, in a coax system the number of incoming signals is limited, imposing constraints on what is possible.</li> </ul>
	<ul style="list-style-type: none"> <li>• Additional Satellites. A FIRS tends to work more efficiently where multiple satellites are distributed. For example, it is not really practical to build an IRS distributing more than four satellites. However, for a FIRS this is straight forward.</li> </ul>

In summary, a FIRS is neater, more expandable, probably more reliable and ultimately the better solution. However, in practice an IRS tends to work out less expensive to build.

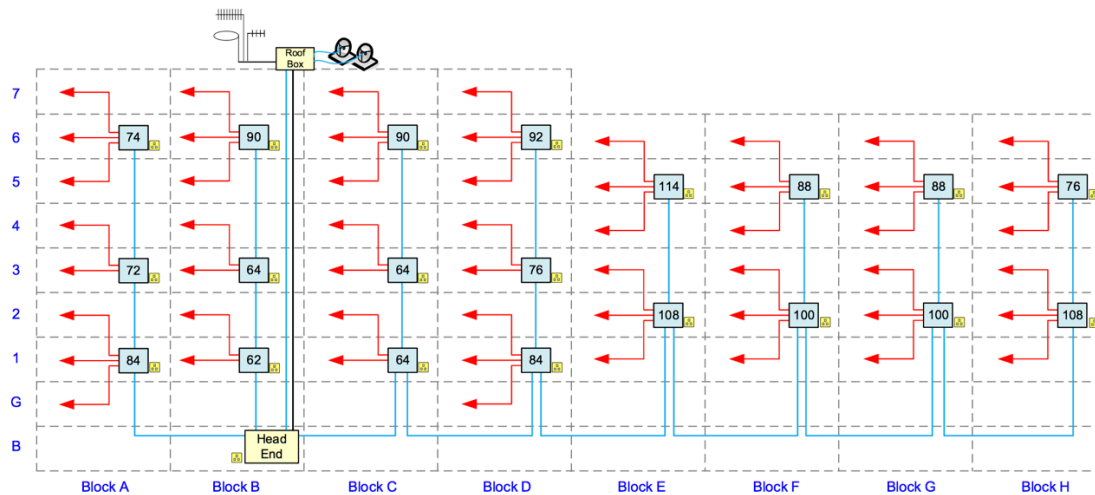
Therefore a FIRS only tends to be used when either:

- The development is up-market and reliability and flexibility is more important than cost.
- The development is widely distributed, so the superior transmission characteristics of fibre cable win the day.

## What is a Hybrid IRS?

Most new large IRS's are designed as hybrid systems, utilising fibre for the backbone routes (taking advantage of the higher bandwidth and distance capability of fibre) but still using coax cables to the

homes.



## How can I Include International Satellite Services into an IRS?

It is a common requirement that the IRS provides more than just Astra 28.2 satellite. This is especially true in areas with a high density of international residents. Popular international satellites in the UK include Hotbird, Arabsat, Nilesat, Astra 19, Turksat and Hispasat.



Additional satellite services can be added to an IRS by providing more satellite dishes at the head end and more backbone cabling and equipment to distribute the extra signals.

Although it is possible to add satellites to an existing IRS, it is always much more cost-effective to do this if the IRS has been designed and built to provide this expandability.

A very popular configuration is to offer Astra plus Hotbird. Hotbird carries a broad section of European and Arabic channels.

## Can an IRS be used with Sky Q?

The answer is yes.

However, a Sky Q satellite box requires a different type of signal than the traditional Sky+HD box.

Therefore, a pre-Sky Q IRS will require an upgrade before Sky Q boxes can be connected.

Alternatively, Sky Q adapters can be used. These connect to the outputs of traditional multiswitches and provide signals in a suitable form for a Sky Q box.

A new IRS should be designed with Sky Q in mind. Therefore, at least one coax feed to each dwelling should provide Sky Q compatible signals. Alternatively, for a FIRS, the dwelling TV equipment should provide at least one Sky Q compatible signal.

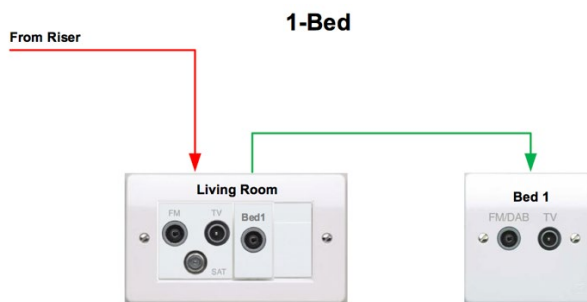
## What TV sockets are required in a home connected to an IRS?

Irrespective of whether the distribution is IRS or FIRS, within the dwelling coax cable would always be used for the distribution of TV services.

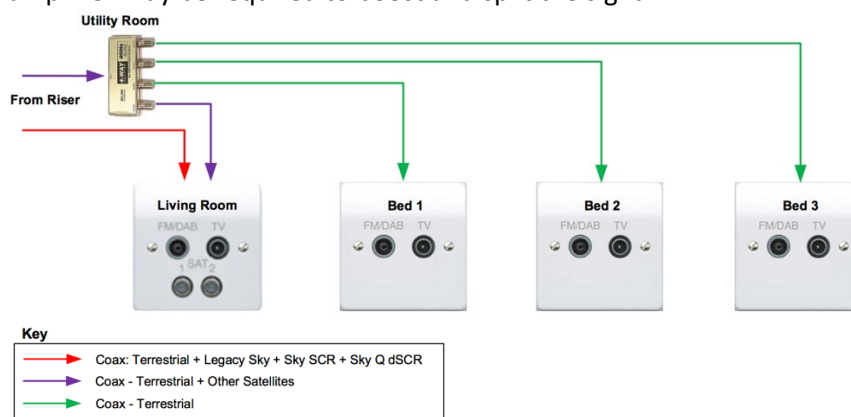
It was once the case that only one TV outlet was normally required in a home, in the lounge. With the proliferation of low cost TV's, it now popular to require at least one TV outlet in every main room or bedroom.

However, there are a number of different ways of organising the TV sockets, with differing levels of functionality, flexibility and build cost:

- The minimum arrangement is for a TV/Satellite Triplex outlet plate in the Living Room, providing Sky Q compatible signals. Plus a single TV socket in the master bedroom, taking its signal from the Living Room return socket.

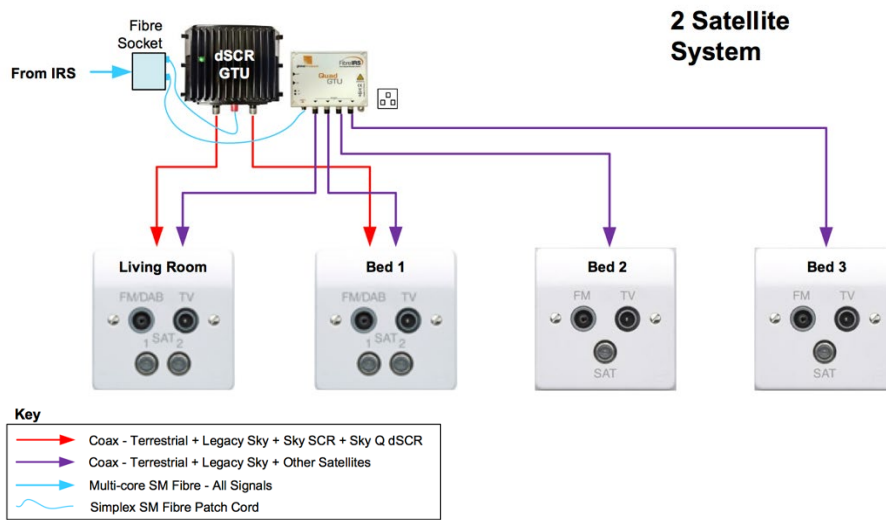


- If the IRS provides additional satellite services, these can be provided via a second cable to Sat 2 on a Quad outlet plate in the Living Room. Note that Sky Q and International satellites cannot normally share the same coax cable.
- If TV sockets are required in all of the bedrooms, then each can have its own TV feed, either taken from the Living Room return or split from the dwelling incoming signal. A small TV amplifier may be required to boost and split the signal.



- As additional Sky Q boxes connect to the master via data links (wireless or wired), only the main/master Sky Q box in each dwelling would normally require satellite signals. On this basis, only the Living Room outlet will require satellite signals.
- For high-end dwellings, there may be a requirement to provide support for Sky+HD, Sky Q UltraHD (only available from a main box) or international satellites in other rooms. In which case additional TV/Satellite Quad or Triplex outlets will be required in these rooms. The

example below shows a FIRS 2-Sat distribution system, into an apartment requiring satellite signals in all rooms.



## What is IPTV?

IPTV within this context means TV distribution within a building or campus. The term IPTV can also be used to mean streaming TV over the Internet, which will not be discussed here.

IPTV means distributing TV over an IP data network (or LAN). It is applicable where there is already an installed building-wide structured cabling system and network, hence saving the requirement for additional coax cabling.

An IPTV system will consist of a IPTV headend, which will take terrestrial TV and selected satellite channels (very like SMATV) and makes them available on the LAN.

Users, can then view these channels at any point on the LAN, either from a LAN connected PC or from a standard TV connected to the LAN through an IPTV decoder.

IPTV is most suitable for organisations where there is already a network and several TV's will be required. Typical users are large offices, hotels and entertainment complexes.

