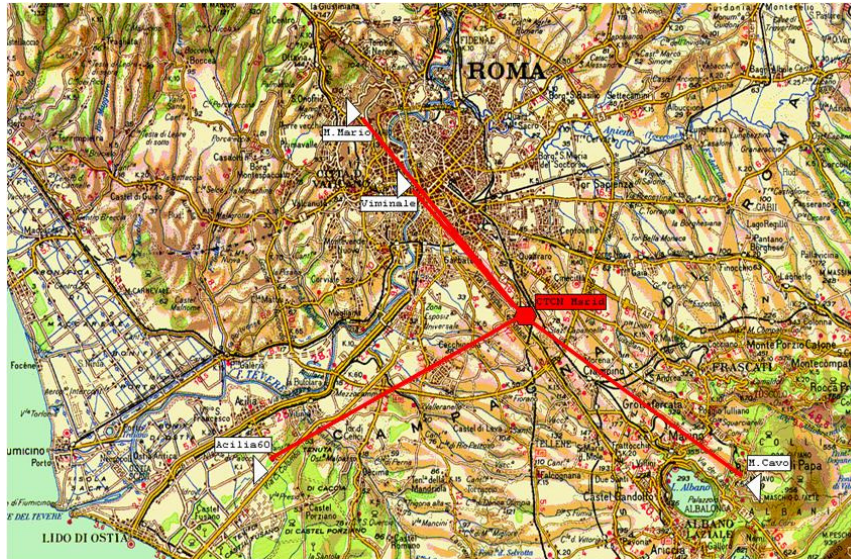


RF linked simulcast radio network



The best solution for wide area radio coverage

ABSTRACT

This presentation wish to explain the characteristic aspects of a **simulcast radio network**. It will be considered only one broadcasting channel, **RF linked**, network, but the same structure can be implemented for multichannel broadcasting.

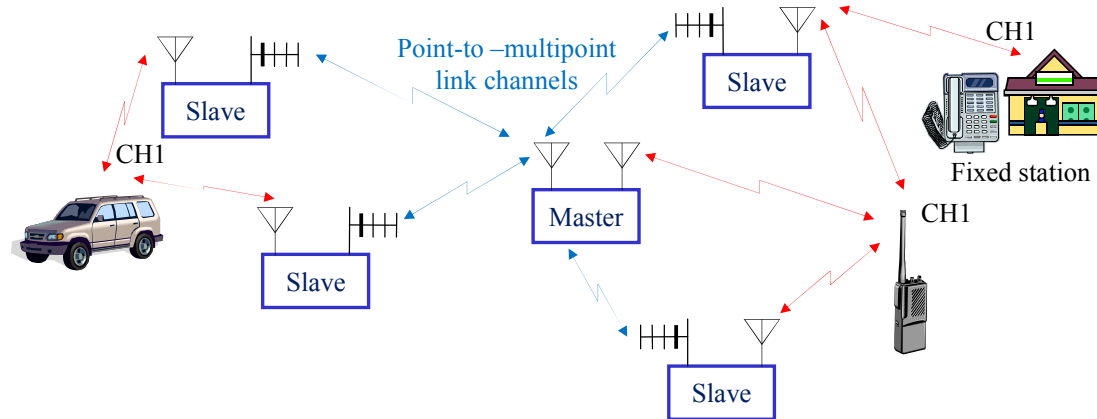
Block diagrams of received signals **up-link** and transmitted signals **down-link** elaborations, together with an explanation of the effects of amplitude, phase and delay **equalization**, give a clear overview of network potential.

A simple propagation model simulation can help to correctly size network, which, thanks to the “low” radio frequency band used, can cover a very wide geographical area with a small number of repeaters. To further extend coverage area, a network configuration including **sub-master station** will be explained.

Master, submaster and slave station **appearance drawings** and an example of a network **economic cost calculation** will close this presentation.

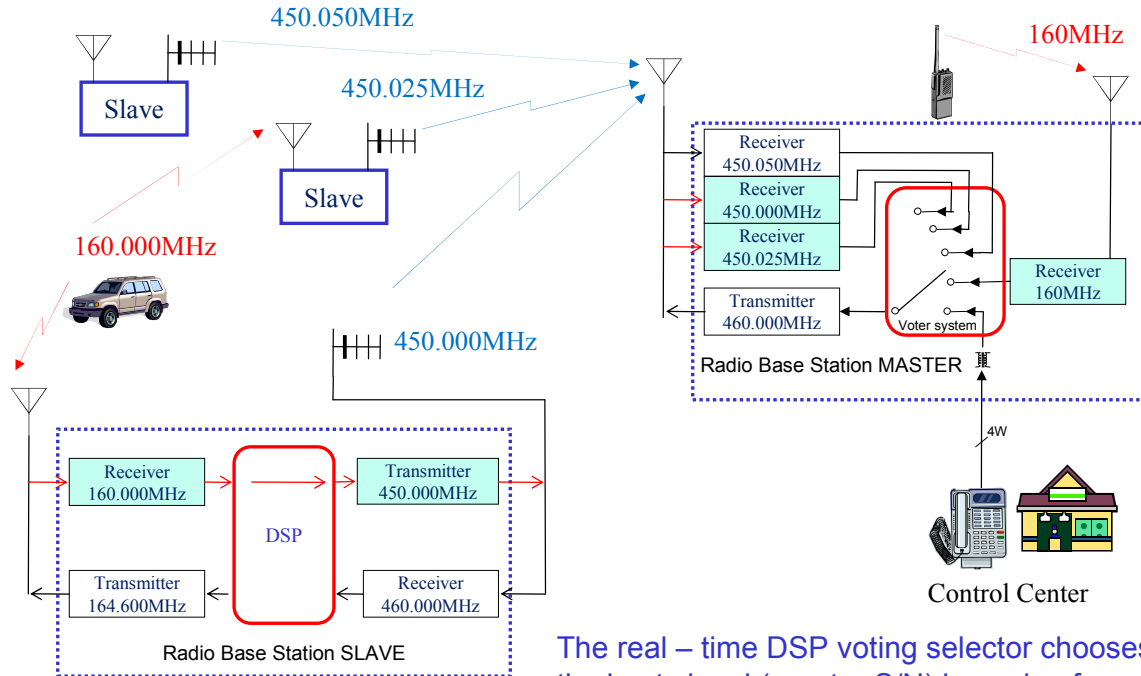
Network – signal connections (1 ch)

Radio Activity
Solutions



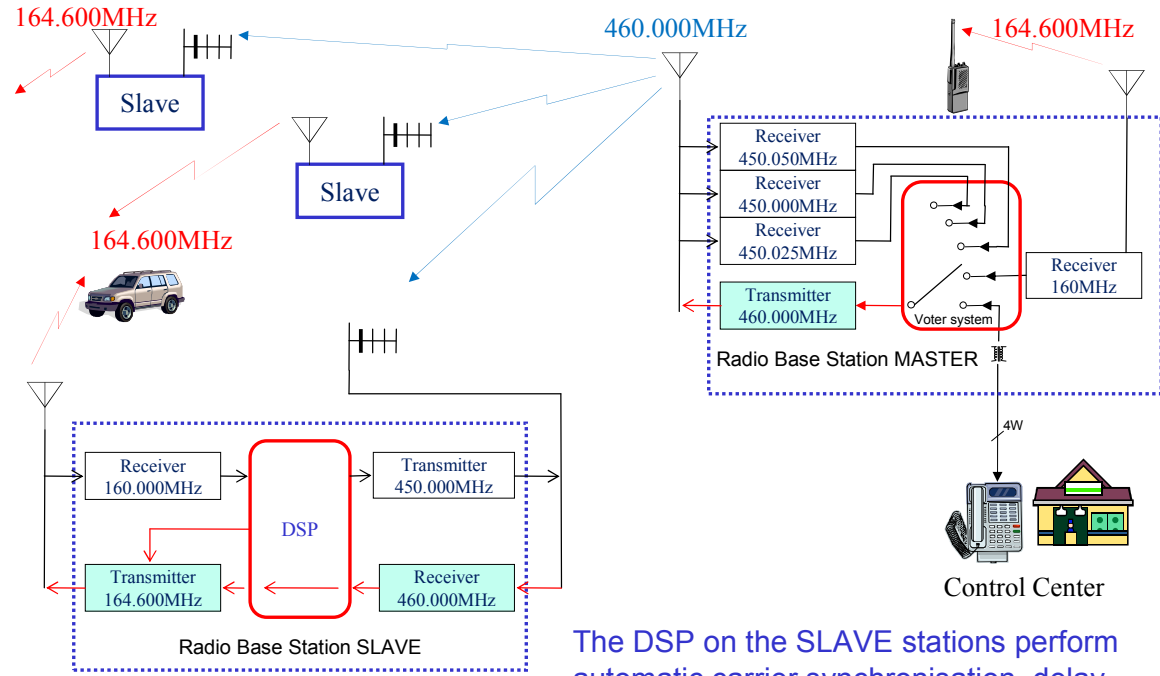
- The same RF channel over all Network => One communication per channel
- All stations directly connected to the network => Integrated communication sys
- Automatic roaming and hand-over => Easy to use
- Wide coverage area => easy to expand coverage by adding “slave” stations
- UHF narrow band interconnection channels => low infrastructure costs
- Functioning like single “big repeater” => automatic and simple conference call operation

Up-link signal path (example)



The real – time DSP voting selector chooses the best signal (greater S/N) incoming from the SLAVES and sends it back to all the SLAVE stations.

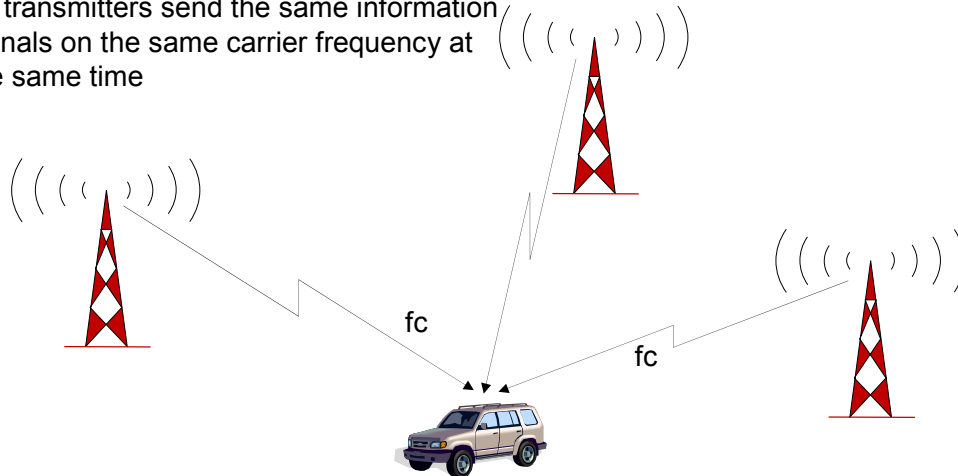
Down-link signal path (example)



The DSP on the SLAVE stations perform automatic carrier synchronisation, delay compensation and audio equalization.

What does “simulcast” mean?

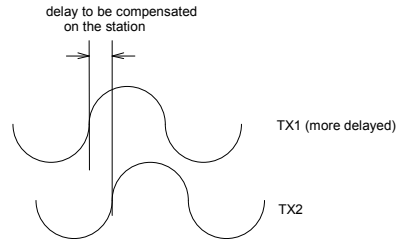
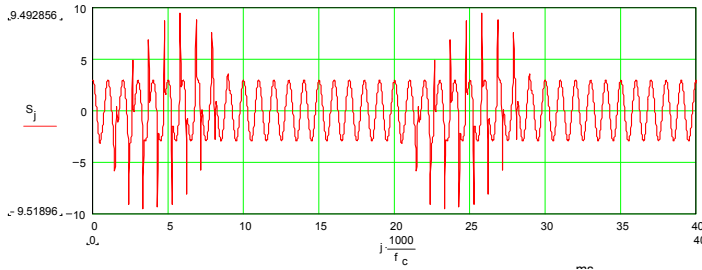
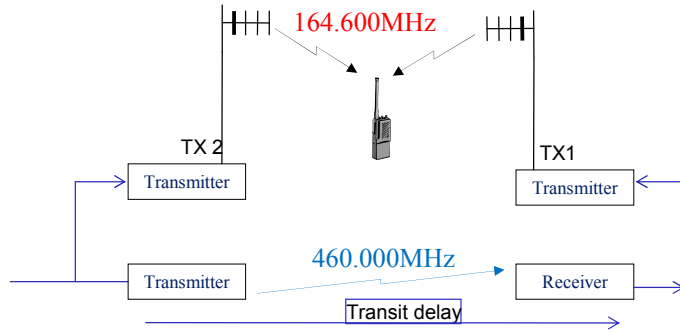
All transmitters send the same information signals on the same carrier frequency at the same time



- The same RF channel over whole coverage area=> no channels change through different repeaters, frequency saving
- Equivalent to a “big cell” single repeater => no special signalling like MPT1327 is required (fully transparent to conventional mobile equipments).
- Automatic roaming and hand-over => Easy to use, fast set-up call

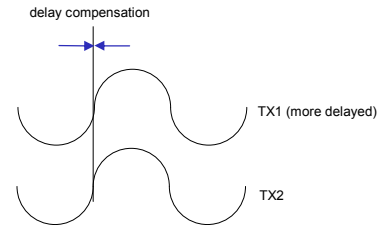
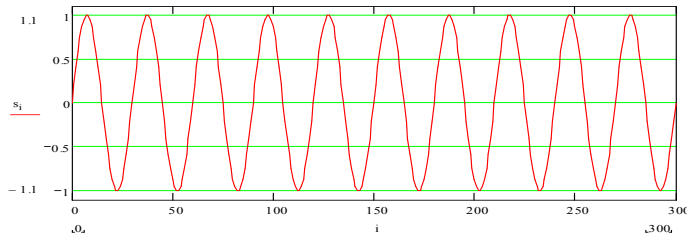
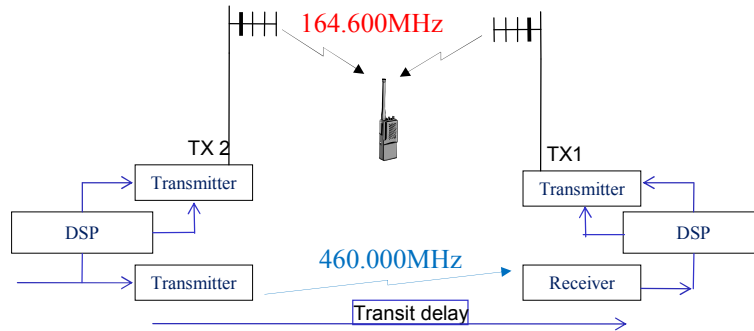
Network – down-link equalization

If the transmitted signals are not accurately equalized in amplitude, phase and delay the mobile receiver will hear a very noisy signal

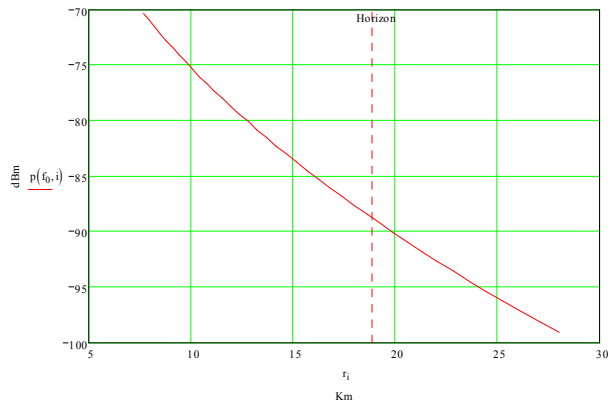
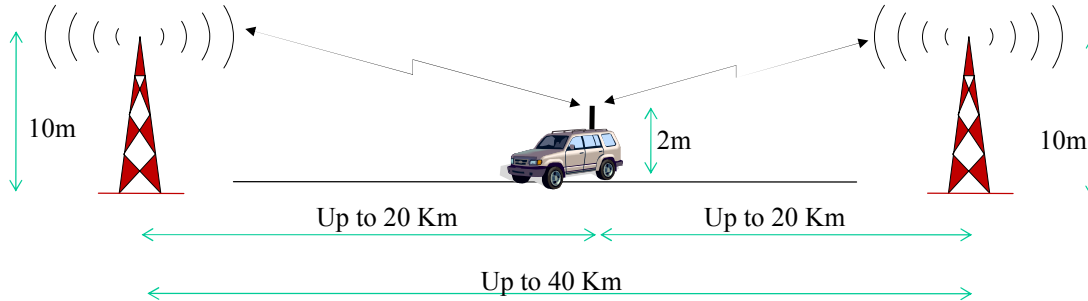


Network – down-link equalization

With the appropriate equalization and synchronisation the signals “sounds” very good

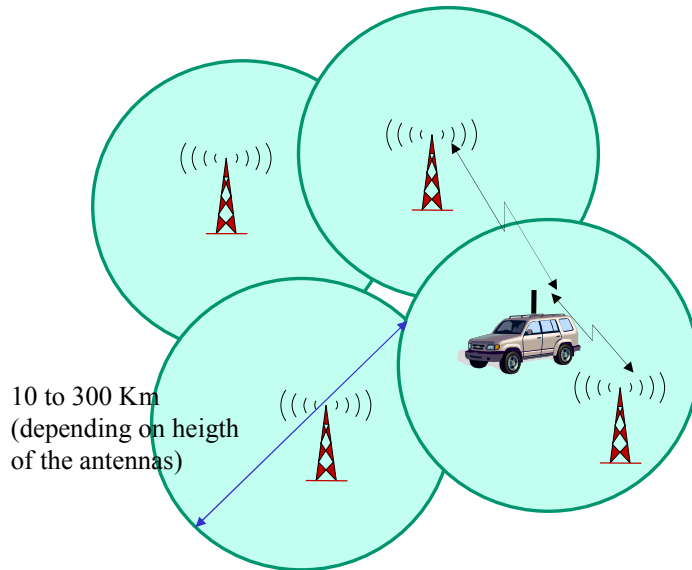


Propagation model - 10m towers example



Antenna gain = 12dB
Base station antenna height = 10m
Mobile (train) antenna height = 2m
Frequency = 160MHz
RF Power = 10W / +40dBm
Horizon = 18.8 Km

Coverage area / open channel



The communications are in “open channel” (conference) mode over the entire coverage area . This functionality ensures the best way to coordinate emergency accidents (no “blinded trunking”).

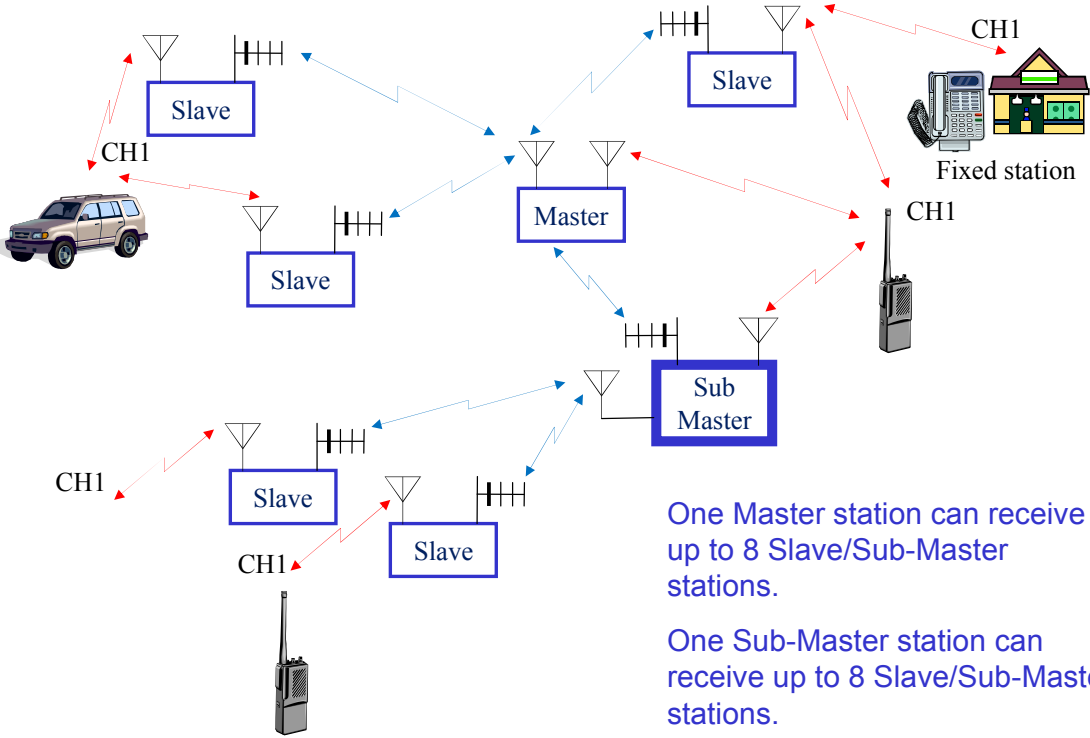
The coverage area depends on the antenna’s height and on the number of radio base stations. It can spread from 10 to 300 Km or more.

The coverage area can be easily adjusted to reach special geometry (long valley, part of lands, ...).

The use of a single broadcast channel permit an optimum spectrum efficiency.

The coverage area may be extended with the insertion of other SLAVE / SUB-MASTER base stations

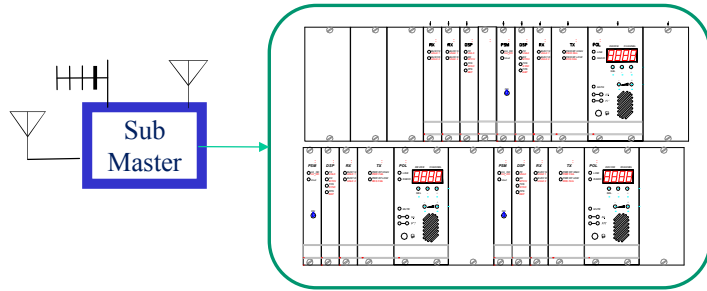
MASTER / SUB-MASTER / SLAVE



One Master station can receive up to 8 Slave/Sub-Master stations.

One Sub-Master station can receive up to 8 Slave/Sub-Master stations.

Base stations appearance



The Sub-Master station integrate 3 full-duplex transceivers

The base stations are very compact and reuse the same elementary units.

