



COFDM is the modulation format which allows digital television to be broadcast to our homes in urban areas. The digital stream is transmitted on 2000 closely spaced carriers within a bandwidth of 6 – 8MHz. The transmission format is very robust and despite losing some of the carriers due to multipath and clutter the video picture is recovered. The COFDM's ability to operate in a broadcast mode without a direct line of sight link makes it the most favoured modulation scheme for mobile video

links involving person to control base, or vehicle to vehicle or aircraft to land video links. COFDM can also dramatically improve the covert surveillance of a battle front or terrorist route, where the equipment may be hidden or buried and retransmitted by a small repeater network back to a safe base

Broadcast Links - battlefront and border surveillance

COFDM systems are particularly powerful when a small omni antenna is used for covert broadcast application as may be required when surveying a battle front, or border, or terrorist route. The covert camera, transmitter and battery are hidden, disguised, or buried. The COFDM transmitter will broadcast the video a distance of 1 – 5Km from the scene of threat to a small IF repeaters which will further relay the video another 10 – 20Km

Mobile Links – surveillance of crowds or threats inside buildings

COFDM is particularly good for mobile applications covering person to person, or vehicle to vehicle or tank to tank video links. One example is where a video camera is carried by a security or military officer into a building or in a crowd or other scene of threat. The covert transmitter and battery are worn in a vest or belt. The camera is housed in a hat or hand carried. As the police or military enter the building or scene of threat video is broadcast back to a mobile control centre. Providing the signal is not below the receiver threshold of -90dBm the video will be recovered – which is not possible with other forms of modulation



**Digital RF Ltd
Walford House,
Generals Lane,
Boreham, Chelmsford
Essex CM3 3HW**

**Phone: 44 1245 467786
Fax: 44 1245 468716
Mobile: 44 7887 537 876
Email: digitalrf@btconnect.com**



Terrorist Attack on Mass Transportation

Most countries fear an attack on their mass transportation systems. Unmanned trains fitted with radio cameras might be used to survey any terrorist action before sending relief staff. COFDM is probably the only form of modulation which will transmit video down a tunnel.

Surveillance of land by aircraft.

Regular surveillance of a strategic land mass from the air can often detect and monitor the movement of terrorists or hostile forces before they can inflict damage. An area of 100Km diameter can be surveyed by fitting an aircraft with a camera and COFDM transmitter. If the video cannot be received directly by the Control Centre RF repeaters can receive the information and relay the video to a Control Center.

Marine Communications

COFDM will operate very efficiently across water where a line of sight link is difficult to maintain and the signal is also affected by ducting. These strong advantages it has over other forms of modulation makes it suitable for both ship to ship and ship to land applications

Robot video and control link

COFDM is particularly good at recovering video from a robot which has been sent to survey a building or area of threat. Rarely is there a direct line of sight link connection from the robot to the receiver and the video is both essential for steering the robot and surveillance.

Choice of Frequencies

The COFDM units are available at UHF, L, S, C and X band. For surveillance at the battle front or in tunnels 300 - 400 MHz UHF band is best. For mobile transmission from a street or crowd scenes, or from an office tower, or for air to ground applications, L band is very effective. L, C and X band may also be used for line of sight links.

Transmitter/Receiver

The analogue video signal is digitized and MPEG compressed to around 4.8Mbits/s. This stream is multiplexed with two 64Kb/s MPEG audio channels and a 64Kbit/s data channel. The composite digital stream is encrypted realizing a bit stream of 5Mb/s. A Viterbi error correction code is added which corrects random errors by adding one error correcting bit for every real bit. The composite 10Mbit/s stream is converted to 2000 parallel orthogonal digital carriers spaced at 5KHz and on the nulls of each digital carrier spectrum to avoid adjacent carrier interference. Four phase modulated follows realizing a transmitted symbol rate of 5MS/sec and spectrum of around 5MHz. To avoid adjacent channel interference, the occupied bandwidth is 8MHz. If information is lost due to multipath destruction the remaining energy reconstitutes the video. In the receiver the reverse process applies. The threshold of the receiver is -90dBm, 10 dB lower than an equivalent FM analogue receiver

IF Repeater

To enhance the system, and to allow the video to be viewed away from the scene of the threat, a covert IF repeater is offered which receives the signal from the COFDM transmitter, changes frequency, amplifies and retransmits to the control centre. The retransmitted signal may be another channel in the same frequency band, or it can be in a different band eg the unit receive a channel in the UHF band and retransmit a channel in S band. The IF repeater incorporates a linearised output power amplifier for 200mW, additional higher power amplifiers may be added covering 1 – 10Watts