



CASE STUDY:

Avoiding Conflict: Keeping signals operational during interference

Why temporary traffic signals experience radio communication failures and how the latest ACM upgrade overcomes channel conflict.





The Challenge

A common problem exists with portable and temporary traffic signals whereby congestion in the radio spectrum can cause communication between units to break, leading to failures.

The radio environment is challenging for temporary signals, particularly those situated in urban environments or close to construction sites/critical infrastructure.

Conventional temporary signals are unable to automatically adapt to congestion in radio bands, which can occur at random or persistently, for example, when walkie talkies are used on construction sites. Instead, a laborious process of setting a new channel manually on each signal is required. This is time consuming and typically leaves the junction unsignalled whilst the change is implemented. Even after such a change, there is no guarantee that the radio will operate reliably.

The resulting failure of traffic signal radio communications causes significant disruption to road users and means regular call-outs for traffic management companies to restart the system.

During our research, our Engineering Team observed various patterns in radio user behaviour, identifying peak and off-peak usage, and times where spikes are likely to occur. At our challenging test site, 75% of the available 458Mhz radio band was found to be in daily use by other services. This equates to 11 unusable channels in a 15 channel radio system or 23 unusable channels in a 32 channel radio system.

“Instead of asking how good the radio channel is at the moment, ACM now asks how bad has this channel ever been over the last few days”

Dr Darren Hudson, Sr Projects Manager

The Solution

As a result of capturing and analysing a wide range of data at some of the most challenging sites, our Engineering Team have identified and implemented improvements to our Active Channel Management technology, leading to a significant further boost in system reliability.

Active Channel Management (ACM) technology analyses the radio spectrum, and adopts the channel most free of congestion. However, this can result in changing to a channel that is quiet at night and busy during the day, which raises the risk of radio interference.

The latest enhancement monitors patterns in the use of the 458MHz band over an extended period and remembers which channels to avoid.

The Results

The result of this change to ACM has been surprising. Since upgrading the technology we have experienced no instances of going to ‘lights out’ flawless communications between lights at one of our most challenging sites in Central London.

The upgraded ACM radio technology takes more account of the bigger picture in terms of other users of the band that come and go with time. The result of this is that the system makes less channel changes but the choice of channel is exactly the one required to keep the system running at peak performance. This change in emphasis also helps the systems around us better decide which channel to use, allowing Metro and Evo1 signals to work in harmony with other frequency users.

The latest enhancement to ACM Technology is being rolled out across Metro Pro and Evo1 Pro enabled systems throughout 2023.