

Signal reporting in DMR (and other digital voice radio systems)

The nature of the beast:

Radio signals have to be strong enough and free of interference to transmit adequate quality voice traffic. Also the equipment used in the transmitter and receiver must be working correctly and operated correctly by the user.

In an analog system (AM, FM,SSB etc) a signal may be degraded by low signal and/or noise. The effect is gradual and reported by Readability (5=best to 1=worst) and Signal (9=strongest to 1=weakest).

A basic digital system could use a CODEC (Encoder at the TX and Decoder at the RX). Such a system would encode the audio frequency signal to a digital stream and reproduce the audio signal at the receiver. However this is not used in DMR (or any 2 way radios) due to the increased Radio frequency spectrum required (data speeds of 16 Kbits/second in GSM (2G mobiles)).

To reduce the digital data rate (and hence the spectrum required) a VOCODER (Voice encode/decoder) is used. Some vocoders are proprietary and some are open source. A VoCoder takes human speech characteristics into account eg vowels, consonants etc. It essentially deconstructs voice components in the transmitter/encoder and reconstructs them at the receiver/decoder.

We would like to think that our digital signal was as good as it could be but impairments can and do occur sometimes.

Firstly there are audio distortions the same as in any system:

Too loud or soft or distorted etc (due to setting error, too close to the mic or component fail)

Then there is degradation of the signal in the Digital/RF path due to lack of signal or interference. These degradations cause errors in the digital stream (commonly referred to as packet loss). As DMR (and other systems) are often interconnected by servers and bridges on the internet, digital errors can occur there too (due to congestion, inadequate resources or misbehaving software). There is also the possibility of signal collisions (coincident transmissions on the same digital channel (Talk Group) but from different locations.

Signal reporting:

Parrot: a self test facility.

Before calling on air it is wise to hear how your own audio sounds.

In most DMR system the “Parrot” is accessed using TG 9990. Look up the exact procedure for the system you use (Mostly a Group Call TG9990 will work). To use you make a short transmission and it is repeated back to you. There are times when the “Parrot” is not available so it is not a failsafe test of your signal “getting out”.

On air report from another station:

A report from another station is quite subjective and reflects personal preferences and biases. Get more than one report. This is advisable for any type of signal, not just digital. If possible get a comparative report (is your signal is louder than the other station etc). If many station report similarly then you can believe it.

How to report on a signal:

There is no precise way of signal reportin (no 5 x 9 etc).

Your report could contain:

An overall quality: Excelllent , good, useable , poor. If not good describe how.

Mention if louder or softer than average (ie you had to turn your volume up or down)

Mention if there are any dropouts long or short.

Mention if any shrieks or other loud noises.

Mention if you have any known impairment affecting you station that may affect your reception (e.g. local interference or your station is on the fringe of a repeater service range).

A typical report may be:

“ Your signal is as good as any with no dropouts or noises.”

“ Your signal sounds good overall but there were a few dropouts not long enough to miss anything”.

“ Your signal sounds good but seems a lot louder than most”

“ Your signal contains dropouts and a few shrieks. It could be an RF or network issue”.

Be as honest and objective as you can.

Don't just say “Your signal is rubbish” without describing how it is impaired.

Equally don't say “Your signal is perfect” when it is not.

It is worth reporting even minor or infrequent dropouts & shrieks as the margin between a good signal and a bad one can be quite small. (i.e. if a station can access a repeater on low power with a few dropouts that could get worse if the signal level fades. It would be better if that station used the next step up in power for a reliable signal.)

Be aware that your equipmet you use to report on another can affect your report. Take this into account. (i.e. if you are consistently hearing bad audio from others, check your own station).

On the next page is a suggestion for a checklist for digital voice signal reporting

Signal reporting guide:

Note this is a guide only. Use any or as much as you consider useful.

To use:

Select in turn the characteristic in the first column then select one of the comment in columns 2 - 6

Loudness	Very low Had to increase the volume	Lower than average but still acceptable	Good about average	Higher than average but still acceptable	Very high. Had to reduce the volume
Quality	Distorted unreadable	Slight distortion but readable	Good average.	One of the better signals	Amongst the best heard
Dropout frequency	Often. Disrupting understanding	Often. Annoyance value	Occasionally.	Hardly ever	No dropouts
Dropout duration	Nothing heard	Missed the last half of your over	Missing a word or two.	Not sure if you finished your over.	No dropouts
Clicks & shrieks	Often. Unpleasant.	On start or/and finish of TX. Tolerated.	Occasionally. Tolerable	Occasionally.	Never
Other comments	Breathing noises. Would benefit by speaking a little away from the microphone.	Missing the first words of your transmission. Try waiting another second or so after PTT to speak.	I think you may have timed out. You were saying	I think you doubled with another station.	I may have receiving issues at my station. It's always worth getting more than one report.