
CHATHAM AERONAUTS
EST:1955
FLYING CLUB INC.

The difference between: DSM, DSM2, DSMX

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DSM

- Digitial Spectrum Modulation
- Developed by Spektrum, licensed for use by JR and others. Essentially the first 2.4GHz protocol designed for unlicensed hobby radio control.
- Single channel 2.4Ghz transmission. 79 channels total spaced 1MHz apart (2.400 to 2.4835GHz)
- 4096 step resolution (max)
- Added 5.6 ms latency to the standard 10-20ms FM was already seeing.
- 3000’ range

DSM – What happens when there's interference?

- At startup transmitter looks for open channel (of the 79 availble). If none found it will not transmit.
- Once found TX is locked to that channel. RX listens for GUID and locks to same.
- If channel is lost (interference) while in use, RX goes into HOLD.
- Proved to be weak in harsh R/F environments. That and single (fixed at startup) channel lead to comprised connection from Tx to Rx.

DSM2

- DSM2 uses two channels to avoid interference.
- Also added wideband DSSS: Direct Sequence Spread Spectrum
- Although DSM2 is locked to channels set at startup, wideband DSSS makes each channel more resistant to interference.
  - Sprektrum says think of it in terms of a river. Narrow band (DSM) is a stream, doesn't take much to stop the water. DSM2 wide band is like a river. A small blockage has little impact on the overall flow.
- Basically the signal is spread over a wider frequency band for any particular "channel"
  - This is done by adding a coding scheme (negotiated between RX and TX) to the base signal.
  - Each transmitter/receiver pair uses it's coding scheme to "scramble" the signal. The coding schemes are designed in such a way that even if two stations are transmitting on the same frequency the respective signals can still be isolated by the receivers.

DSM2 - Startup

- At startup:
  - Transmitter looks for two open frequencies.
  - Once found starts transmitting. You'll often see this on your transmitter as the "active" light coming on.
  - At power up the receiver is scanning all channels, looks for the unique ID that was set when you bound the transmitter and receiver(s).
  - Once both channels are found, the receiver powers up the servos (they'd have been in failsafe or lock position until now).
- By using DSSS, DSM2 was able to achieve longer range than DSM using the same power.
- DSM2 receivers are backwards compatible to DSM

DSM2 – What happens when there's interference

- If one channel hits interference the second is still available.
- If both encounter interference signal is lost (RX moves to failsafe if set)

DSMX

- Adds CDMA (Code Division Multiple Access) to the DSM2 specification.
- So now you have wide band communication plus frequency hopping.
- Frequency hop pattern is based on GUID making it unique to each radio. Some other 2.4 frequency hopping algorithms follow a set hop path (FHSS for example). This potentially could lead to the interference following you to the new channel (unlikely).
- Frequency hopping uses 23 channels in the 2.4Ghz spectrum.
- DSMX receivers are backwards compatible to DSM2.

DSMX – What happens when there's interference?

- There is a chance your channels become completely swamped with multiple transmitters. Due to the coding and frequency hopping this would result in a (theoretical) cut-out of just a couple milliseconds as the Tx and RX move to new channels.
- DSM2 would lock out completely in this scenario.

What should I expect for range?

- Manufactures are hesitant to publish range specifications, but several users online have tested and found unobstructed 3000’ (~900m) is reliable.
- Keep in mind “Park Flyer” receivers are limited to 3-400’ (~90-120m)
- Carbon Fibre can dramatically reduce range. Use receivers with (shielded) antennae extensions to get outside of fuselage.
- Manufactures are recommending reduced power range check at 90-100’ (~30m)
- Consider doing a “full range check”: Model on table about 30” (76cm) high with motor off/disconnected. Call a buddy watching the model from .6 mile (1km) away and test movement. A.D Shad road is 540m away from our field. The next farm to the east on the 10th line (north side of the road, not the one at the intersection of 10th and A.D Shad) is 1km from our field.