

What is channel utilization and why does it matter?

What Channel Utilization Means

Channel utilization is the percentage of time the LoRa radio channel is occupied by transmissions. It's displayed in the [Meshtastic app](#) as a percentage (visible in the channel info or device telemetry).

Think of it like a single-lane road. If utilization is 10%, there's plenty of room for everyone. At 25%, it's getting busy. At 50%, there's constant congestion and collisions. At 80%+, the channel is saturated and very few packets get through.

Why the 25% Threshold Matters

Meshtastic's flood routing uses random backoff timing to reduce collisions - nodes wait a random short period before retransmitting a packet. At low utilization, these collisions are rare. Around 25% utilization, collision probability starts degrading throughput significantly. Above 50%, the network effectively becomes unusable.

What Drives High Channel Utilization

In order of typical impact:

1. **Position broadcast interval too short** - Default position broadcast can be set to 30 seconds or less. On a 100-node network with everyone at 30-second intervals, position traffic alone saturates the channel. Fix: set position broadcast to 5-30 minutes for fixed nodes, 1-5 minutes for mobile nodes. `meshtastic --set position.position_broadcast_secs 1800`
2. **Telemetry too frequent** - If many nodes broadcast device/environment telemetry at 5-minute intervals, the aggregate airtime adds up. Fix: set telemetry intervals to 15-30 minutes.
3. **Long-range preset with many nodes** - Long Slow preset makes each packet take 3-4 seconds of airtime. With 50+ nodes, even moderate message rates saturate the channel. Fix: migrate to Medium Slow or Medium Fast which cuts airtime per packet by 4-8x while

maintaining comparable range.

4. **High hop limits creating more retransmissions** - Each hop doubles the airtime consumed by a packet (original + relay). Reducing hop limit from 5 to 3 cuts airtime by ~40%.
5. **Too many Router role nodes** - Every node set to ROUTER retransmits every packet it hears. In a dense area, CLIENT nodes should outnumber ROUTER nodes significantly. Fix: set personal handheld devices to CLIENT role, not ROUTER.

Target Values for a Healthy Network

Channel Utilization	Status	Action
0-10%	Healthy	None needed
10-25%	Moderate	Monitor; consider reducing position intervals
25-40%	Congested	Reduce intervals; consider faster preset
40%+	Saturated	Immediate action needed: reduce broadcasts, change preset

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