

Observations

Signal Strength (RSRP)

- **Band 1:** -98 dBm → *Fair to weak*
- **Band 7:** -106 dBm → *Weak*

Band 7 (higher frequency) shows weaker signal strength, which is expected because higher frequencies attenuate more indoors.

Signal Quality (RSRQ & SINR)

- **RSRQ:** -12 to -14 dB → *Poor*
- **SINR:** -20 dB → *Very poor*

Even though signal exists, it is heavily affected by interference and/or noise, likely due to:

- Indoor environment
 - Network load
 - Multiple reflections and obstructions
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Carrier Frequency & Bandwidth

- Both bands use 20 MHz bandwidth, which is good for capacity.
 - However, usable throughput is limited by poor SINR, not bandwidth.
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Analysis

Effect of Signal Strength and Quality on Performance

Signal strength (RSRP) and signal quality (RSRQ, SINR) have a direct impact on data speed, network stability, and connection reliability.

In the observed measurements, RSRP values range from -98 dBm to -106 dBm, indicating fair to weak signal strength. While the device maintains a connection, such levels are insufficient for consistently high data rates. The situation is further degraded by very low SINR values (-20 dB), which indicate that the received signal is significantly weaker than the surrounding interference and noise.

Low SINR forces the network to:

- Use lower modulation and coding schemes
- Increase retransmissions
- Reduce throughput

As a result, even with a relatively wide 20 MHz channel, achievable data speeds are likely to be low and unstable.

Environmental Factors

The measurements suggest an indoor environment, where signal propagation is affected by:

- Walls and building materials
- Distance from the base station
- Reflections and multipath interference

The poorer RSRP on LTE Band 7 (2600 MHz) compared to Band 1 (2100 MHz) aligns with radio propagation theory: higher-frequency bands experience greater penetration loss indoors.

Network Stability and Reliability

Poor RSRQ and SINR values can cause:

- Increased latency
- Temporary throughput drops
- Possible handovers between cells or bands

This explains why users may experience fluctuating speeds or brief connectivity issues despite being connected to 4G.