

WiFi Signals Explained

Four bars tell you almost nothing

RSSI

- How LOUD the signal is
- Measured in dBm
- Always negative
- Closer to zero = stronger

SNR

- How CLEAR the signal is
- Measured in dB
- Always positive
- Bigger = better

Good signal with poor clarity is still a bad connection.

The Two Numbers

RSSI is volume. SNR is clarity. If RSSI is how loudly someone speaks, SNR is how loudly they speak compared with the noise in the room.

Why SNR matters more:

- Signal -55 dBm on a QUIET -95 floor = SNR 40. Excellent.
- Signal -55 dBm on a NOISY -65 floor = SNR 10. Barely works.
- Same signal. Same bars. Completely different result.
- This is why replacing the router rarely helps
- $SNR = \text{signal} - \text{noise}$. That is the whole formula.

Both phones show full bars. Only one of them works.

The RSSI Scale

Closer to zero is stronger

-30 to -50 dBm
EXCELLENT

Within a few metres of the AP. Everything works.

-50 to -67 dBm
THE TARGET

Voice, video and 4K all reliable. Design for this.

-67 to -72 dBm
WORKABLE

Browsing fine. Calls stutter when busy.

-72 to -80 dBm
POOR

Connected, slow, dropping. Most complaints.

Below -80 dBm
UNUSABLE

Clings on, refuses to move. Worse than nothing.

-67 dBm is the number to remember.



SNR Targets

The clarity number

40 dB and above		excellent
25 to 40 dB		very good
20 to 25 dB		the floor for calls
15 to 20 dB		slow, retries
Below 15 dB		unreliable

Below 15 dB the connection is unreliable no matter how strong the signal is or how many bars are showing.

Aim for 25 dB. Treat 20 dB as the floor.

dBm, dB and dBi

Three units, constantly confused

Know the difference:

- dBm = absolute POWER. Signal and noise floor use this.
- dB = a DIFFERENCE. SNR and wall losses use this.
- dBi = antenna FOCUS. It shapes power, never creates it.
- High dBi = a torch beam. Low dBi = a bare bulb.
- Every 3 dB roughly doubles or halves the power

A 10 dB loss through a wall leaves you a tenth of it.

The Shout-Back Problem

Why turning power UP makes it worse

A powerful access point can be heard right across a building. But the phone cannot shout back that far - its antenna is smaller and its battery smaller still.

What happens when you raise power:

- Coverage LOOKS wider on a survey
- Devices connect from places they cannot reply from
- Your own access points start interfering with each other
- Sticky clients hold on even longer
- And the wall is still exactly as thick as it was

Turn power DOWN. Add access points instead.

Channel Overlap

2.4 GHz: why only 1, 6 and 11



Channels 1,3,5,7 bleed into each other - everyone slows down



Channels 1, 6 and 11: no overlap at all, three clean lanes

2.4 GHz has only ever had three usable channels. Not fourteen.

Channel Width

Wider is not simply faster

20 MHz		~25 clean lanes on 5 GHz
40 MHz		~12 lanes
80 MHz		6 lanes, only 2 without DFS
160 MHz		2 lanes, both need DFS

A wider channel is a wider target. It gathers more noise and leaves fewer clean lanes for your other access points.

Every doubling of width halves your clean lanes.

The Three Bands

Band	2.4 GHz	5 GHz	6 GHz
Clean at 20	3	~25	59
Clean at 160	No	2	7
DFS needed	No	Mostly	No
Range	Furthest	Moderate	Shortest
Noise	Very high	Moderate	Very low
Who sees it	All	WiFi 5+	6E and 7

Keep 2.4 for IoT. Put your devices on 5. Save 6 for demand.



What is DFS?

Free channels, with one condition

Half the 5 GHz band is shared with weather, military and aviation radar. You may use it, but if radar appears the access point must leave that channel immediately.

Use it when

- Normal channels are full
- You need several APs
- Equipment is enterprise grade
- No airport nearby

Avoid it when

- Near airport or coastline
- Voice calls matter
- Old IoT and cameras
- It is your only AP

After a radar event, the AP must listen up to 60 seconds before transmitting.

Sticky Clients

Why your phone holds a distant AP

The DEVICE decides when to roam, never the network. No access point can drag a phone across to itself.

What actually helps:

- Minimum RSSI, around -75 dBm - the single best fix
- Set it BELOW your worst supported coverage, or you cut people off
- Lower transmit power: smaller cells, cleaner edges
- Enable 802.11k, v and r - but test older devices
- Lock only things that never move: desktop, camera, till

All the network can do is stop rewarding a bad decision.

Heatmap Surveys

Measuring instead of guessing

Three kinds:

- Predictive - models the building from drawings, before you buy
- Active - measures real throughput while connected
- Passive - listens to everything, including the neighbours

The tools:

- NetSpot - accessible, homes and small offices, laptop only
- Ekahau - the professional standard, predictive plus validation
- AirMagnet - deep spectrum analysis for interference hunting

You are buying a floor plan with numbers on it.

Mistakes We See

1. Turning transmit power up to fix a dead zone
2. 80 MHz channels in a dense apartment block
3. Reading -70 as better than -50 because 70 is bigger
4. Measuring signal but never measuring noise
5. Judging the whole building by the phone in your hand
6. Mounting APs in a ceiling void or a metal cabinet

Three modest access points beat one powerful one.

Quick Revision

RSSI = loudness, in dBm, always negative

Closer to zero is STRONGER

SNR = clarity = signal minus noise, in dB

-67 dBm is the design target

SNR 25 dB good, 20 dB floor, below 15 unreliable

dBm is power, dB is a difference, dBi is focus

Every 3 dB doubles or halves power

2.4 GHz: only channels 1, 6 and 11

Wider channels = fewer clean lanes

DFS gives free channels but the AP must yield to radar

The client decides roaming, not the network

Turn power DOWN and add access points

Measure first. Then place. Then choose the hardware.

Stop guessing. Measure it.

We survey the building, map every room against the numbers in this guide, and design coverage around what we actually find - then supply, install and manage it across Dubai and the UAE.

Talk to an engineer:

- quicksurfnetwork.com
- info@quicksurfnetwork.com
- +971 4 288 2335
- Suite 115, Al Makateb Building, Port Saeed, Deira, Dubai

More free pocket guides at quicksurfnetwork.com