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# QoS and QoE aspects of emerging satellite technologies

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# D2D vs Satellite internet

## Contrasting limitations and user experience - but conflated expectations

### Satellite Internet

Starlink internet uses specialized devices to send and receive connectivity.

Starlink Mobile uses your existing smartphone, which has a much smaller antenna and much less power.

### Service Scope

Current Starlink Mobile services support either text messaging only, or a limited range of apps.

### D2D Integration

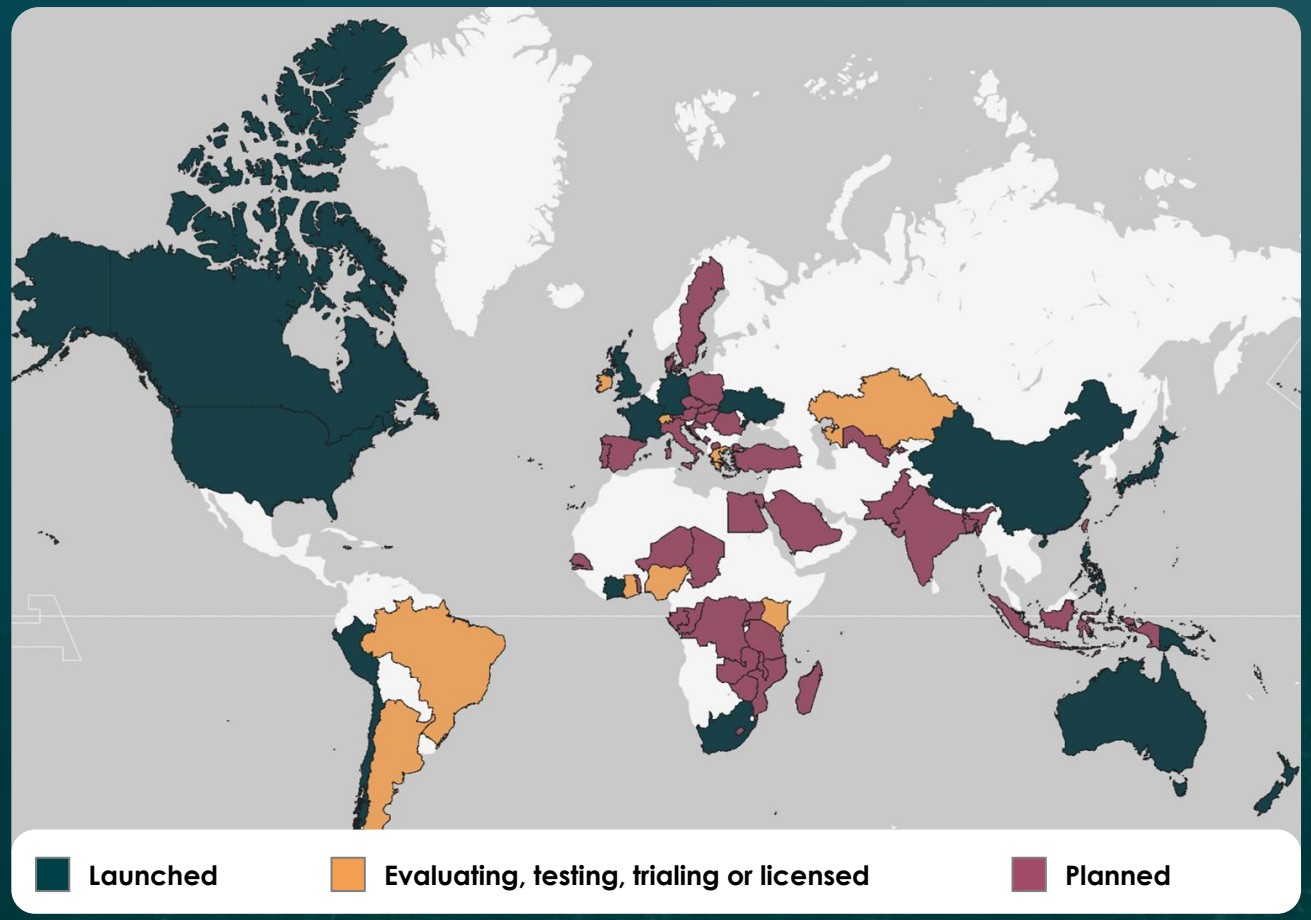
Current D2D services are designed to work alongside mobile services, rather than separately.

Aimed at users on the go, leading to more handoffs and complexity.

Scan the QR code to read our analysis of Starlink performance: "From last resort to first choice: Why Starlink is gaining new customers worldwide"

# D2D becomes part of terrestrial reality

## Countries and territories with D2D partnerships by status




*Source: GSA GAMBoD data, updated April 28th, 2026. Map created with Google Maps.*

### Live trial status

D2D services are already live or in trial from ~45 operators — this is an active test requirement, not a future concern.

### Consumer interest, but cost reluctance

A recent Opensignal poll suggested most respondents would use D2D services if available – but only 47% were willing to pay more.

### New test dimensions

NTN adds latency and link-quality characteristics that scripted test suites built for terrestrial 5G do not cover.

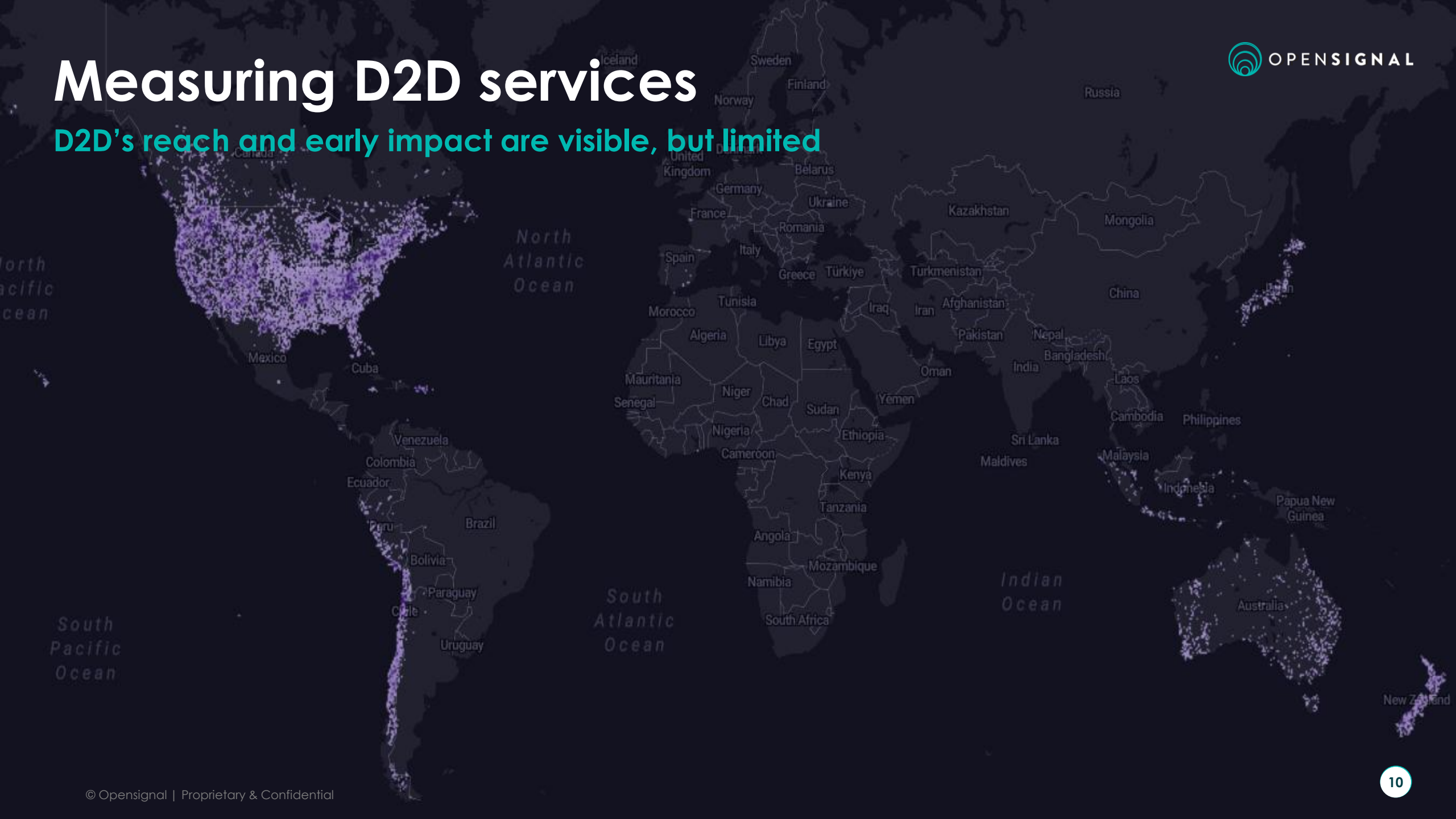
### Upcoming targets

Starlink targeting 150 Mbps by end-2027;
AST SpaceMobile plans 45–60 satellites by end-2026

Scan the QR code to read:
"D2D at MWC26: Sky-high ambitions, ground-level constraints"

# Measuring D2D services

## D2D's reach and early impact are visible, but limited



# Regional impacts vary significantly




## D2D connectivity serves as a vital 'last resort' in rural and remote regions

**However, these areas can sometimes be so remote, as in Australia, that current observed usage remains sparse.**

# Lessons learned from 5GSA

## Impact and adoption can take time – even with early hype

*Six years after initial launch, this is the 5GSA state of play:*

**95**

**operators**

have commercially launched 5G SA, a growth of 42% since 1Q25. (GSA, April 2026)

**-18%**

**reduction in latency**

10 of 13 markets improved

Range: Japan -27% → Brazil +37%

**+21%**

**increase in download**

9 of 13 markets improved

Range: Singapore +79% → Brazil -14%

**+4pp**

**CQ score improvement**

8 of 13 improved; 3 flat; 2 declined

Range: Thailand +10pp → UAE -2pp)

Scan the QR code to read our full analysis: "5G Standalone State of Play: Architecture Deployed, Monetisation Pending"

# Measuring D2D QoS/QoE should be:

## Grounded in reality

- NTN constraints are not bugs - latency, link variability, and coverage gaps are physics, not failures
- Field conditions define the test - outdoor, rural, and in-motion are the use case, not edge cases
- The terrestrial baseline is the reference point - without it, D2D scores have no meaning

## Consumer-centric measures

- Reliability is the metric that matters — not peak throughput, not ideal latency, not lab conditions
- Availability and task completion are the benchmarks, not theoretical maximums
- If it sends, it works — connection success rate is the only score that counts for consumers

***Measuring what users actually experience, not what the technology is capable of needs to be baked into the D2D standards process from the outset – not retrofitted***

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# Q & A