Seattle-Tacoma International Airport

Venue Network Intelligence Report — Deep Edition

Rev 2 — 2026-08 window refresh + Site Finder layer + VNIR gate suite

One DAS incumbent, one carrier riding macro, and one profile the records don't explain: AT&T's seventeen-year in-building path still defines the venue, T-Mobile waits on the Boldyn neutral-host cutover, and Verizon's surge is an attestation question — measured across 103 gates, 203 mapped venue points, 53,055 tile-aggregates, and 250 estimated site-layer centroids.

Prepared by the Imagine Wireless Network Intelligence Platform
Data window: 2025-08-01 – 2026-07-31 · Issued: 2026-08-24 (Rev 2) · Freshness: 24 days (within the 90-day policy)
Primary sources: Ookla Cell Analytics (per-carrier tiles) · Ookla Site Finder (macro-site centroids) · SEA tenant graph (OSM + Google Places, pinned 2026-06)
Reference sources: das_master_feb2026 (SEA row) · Airport-KnowGraph deployment registry (Port of Seattle / Boldyn / AT&T DAS)

Best indoor 5G	Cleanest signal quality	Critical signal (<−110 dBm)	Venue Wi-Fi offload
AT&T · median -90.5 dBm	Verizon · median SINR +12.5 dB	0 of 309 gate-carrier pairs	58.7% of observed MB

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1. Executive Readout

Seattle-Tacoma International Airport, operated by the Port of Seattle, is mid-transition: an AT&T-owned single-carrier DAS in service since 2009 (contract expired 2024 — KG record, cited-not-held) is being replaced by a Boldyn Networks neutral-host DAS (2026 — KG record, cited-not-held). This report characterizes the venue at gate, tenant, concourse, band, serving-cell, and — new this revision — macro-site resolution, across 103 gates, 203 mapped venue points, 53,055 Ookla tile-aggregates, and 250 Site Finder site-layer centroids (big-3 carriers), over a fresh 12-month window ending 2026-07-31.

AT&T — strongest indoor signal; the DAS incumbent.

Healthy 5G RSRP at 95 of 103 gates (92%), venue median -90.5 dBm, best 5G NR at 72 of 103 gates with all-carrier data. Seventeen years of carrier-owned DAS (in service since 2009) shows up exactly where it should: indoors. The current measurement is the AT&T baseline the incoming neutral-host system must hold at parity.

Verizon Wireless — cleanest quality, LTE network of record.

Median SINR +12.5 dB (103 of 103 gates healthy — the most of any carrier), best-serving LTE at 76 of 103 gates, healthy LTE median -90.0 dBm, and healthy 5G at 87 of 103 gates. New this window: best-NR honors across Concourse B (17 of 17 gates) and indoor-STRONGER tenant medians (-6.0 dB, §5.2) with no recorded in-building system to explain them — an attestation question to answer before the cutover decommissions legacy paths unexamined (§3.2).

T-Mobile US — weakest indoors; the carrier the neutral-host cutover most helps.

Healthy 5G at only 17 of 103 gates (17%), venue median -97.9 dBm, and the worst carrier at 93 of 103 carrier-asymmetry gates. The pattern is consistent with no in-building path: T-Mobile rides macro spillover where AT&T rides the DAS. A hosted T-Mobile path is the single largest measurable lift the Boldyn system can deliver.

Why this ordering holds **AT&T's attested DAS explains its indoor dominance; Verizon's clean quality and LTE strength come from a strong macro/LTE layer reaching the building; T-Mobile shows neither. Deployment history explains the ranking — and the ranking is reproducible from the tile export alone.**
Why it matters now **The Boldyn neutral-host DAS (2026) resets all three carrier positions. This rev-2 baseline — two months fresher than rev 1 and now including macro-site geometry — is the pre-cutover reference the new system should be accepted against; §14 is written to paste into that acceptance plan.**
How to read this ranking (and how not to) **Every ranking in this report is signal-layer — RSRP and SINR from an Android crowdsource panel. The export contains no throughput, latency, or user counts (§6, §16), so it measures where signal is, not whether a call or app fails; a strong-signal network can still be congested, and a mid-band network at lower RSRP can out-carry a legacy DAS at higher RSRP. The ranking also partly reflects spectrum strategy (600 MHz reach vs mid-band capacity vs DAS-fed layers — §3.4, §9.1). That is exactly why §14 specifies signal thresholds as acceptance criteria — the quantity this instrument measures — and why experience-layer metrics are the top of the §15 queue.**

2. Venue Snapshot and Asset Inventory

Element	Value	Notes
Airport / IATA / ICAO	Seattle-Tacoma International / SEA / KSEA	Large-hub; ~25.4M enplanements (KG record, cited-not-held)
Operating authority	Port of Seattle (municipal corporation)	Wireless decisions route through Port leadership
FAA size class	LARGE	FAA region ANM; Alaska Airlines primary hub
Concourses analyzed	6	A · B · C · D · N · S (A/B main terminal · C/D + N = Alaska-dominated · S = South Satellite intl)
Gates analyzed	103	Largest clusters: N (20) · C (18) · D (18)
Mapped venue points	203	59 food · 52 transport_admin · 38 retail · 25 services · 14 lounge · 8 other · 4 admin · 3 lodging — terminal-interior tenants AND landside/periphery businesses (deliberate mix, $5.2 basis; point list pinned 2026-06, stats recomputed on this window)
Carriers measured	3	AT&T · Verizon Wireless · T-Mobile US (53,055 tile-aggregates)
Site-layer centroids (Site Finder)	124 LTE + 126 5G (big-3)	Ookla-estimated technology-layer centroids — LTE/NR co-locate heavily, so layers ≠ distinct structures; 79 on/adjacent to airport property; +3 other-network 5G entries (Cellcom US, GCI, UScellular) excluded from big-3 figures ($9.3)
Legacy in-building cellular	AT&T-owned single-carrier DAS (since 2009)	Contract expired 2024; competitive RFP per das_master_feb2026 (KG record, cited-not-held)
Incoming in-building cellular	Boldyn Networks neutral-host DAS (2026)	Active neutral-host deployment per Airport-KnowGraph registry (KG record, cited-not-held)
Technology decision-maker	Matt Breed, CIO, Port of Seattle	KG record, cited-not-held
Tenant airline footprint	31 airlines (graph TENANT_AT edges)	Alaska primary hub; Delta, American, United; intl carriers via South Satellite
How to read the measurement **Every cellular number in this report is an aggregate of crowdsourced background scans from consumer Android devices (≈3% of handsets), binned to map tiles by Ookla, then joined to gate and tenant points. Numbers describe where devices actually were over a 12-month window — not drive-test measurements — and every table carries its n so thin cells are visible.**		

3. Carrier Findings

3.0 At a Glance

Carrier	5G RSRP median (dBm)	5G SINR median (dB)	LTE RSRP median (dBm)	Healthy 5G gates	n (gates)
AT&T	-90.5	+12.0	-92.2	95	103
Verizon Wireless	-91.9	+12.5	-90.0	87	103
T-Mobile US	-97.9	+9.4	-94.0	17	103

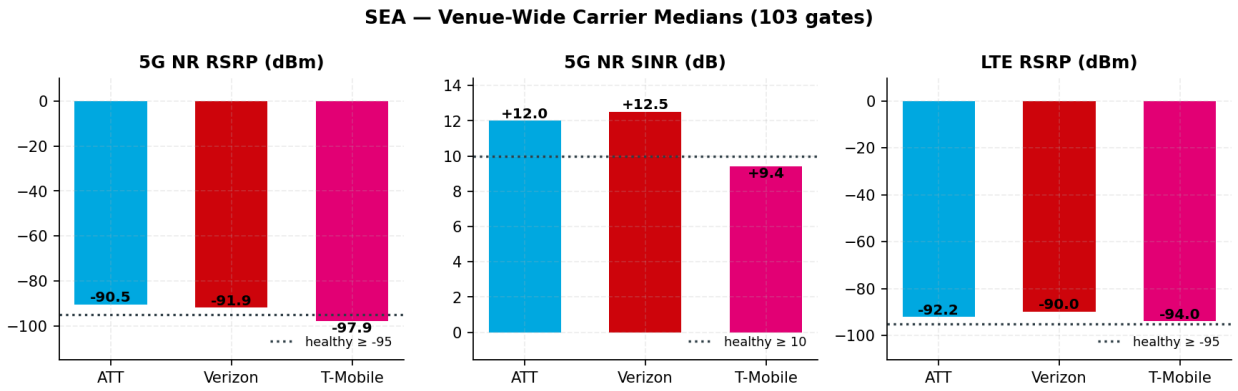

FIG. 1 — Venue medians across 103 gates against the locked threshold ladder ($16). · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

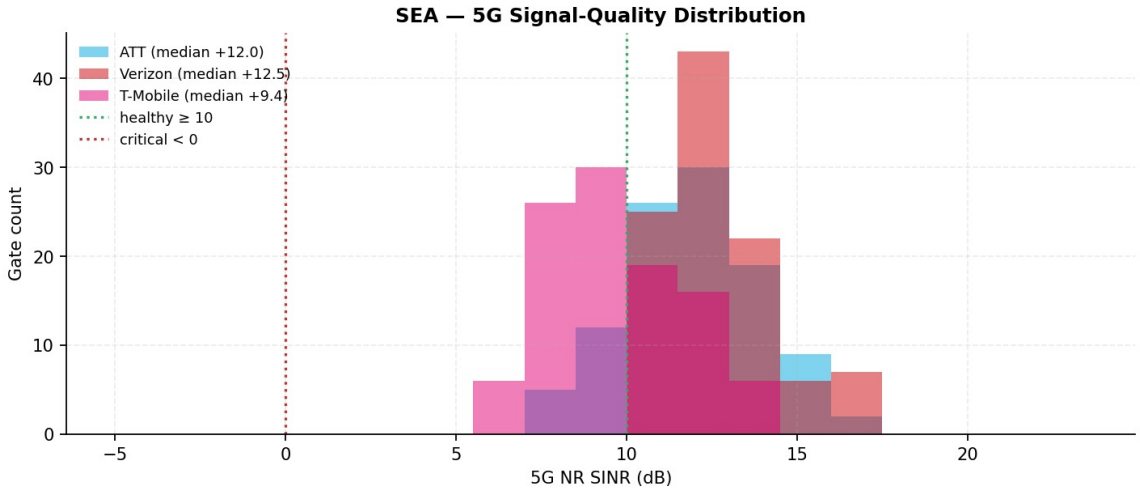

FIG. 2 — SINR distribution per carrier at gate level. · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

Margin note: the AT&T–Verizon podium gaps are small — +1.4 dB on median RSRP and +0.5 dB on median SINR — within plausible crowdsource sampling variation, so the two are best read as effective co-leaders on those axes. The gap to T-Mobile (+7.4 dB RSRP) is robust.

3.1 AT&T — the in-building incumbent

AT&T delivers the strongest indoor 5G in the venue: 95 of 103 gates (92%) in the healthy band, venue median -90.5 dBm, and best 5G NR at 72 of 103 gates. SINR is healthy at the median (+12.0 dB). This is the signature of a carrier with a dedicated in-building path, and it matches the attested AT&T-owned single-carrier DAS in service since 2009 (KG record, cited-not-held).

The deployment history is the explanation, not a coincidence. The DAS contract expired in 2024 and the venue is committed to a Boldyn neutral-host replacement; the measured AT&T profile is the baseline the new system must hold at parity while it lifts the other two carriers.

AT&T framed finding
DAS incumbent: median -90.5 dBm (rank 1 of 3), healthy at 92% of gates. The neutral-host design inherits this bar — 'all three at AT&T's level' is the acceptance target, not 'AT&T's level only'.

3.2 Verizon Wireless — cleanest quality, LTE network of record

Verizon is mid-tier on 5G signal strength (median -91.9 dBm, 87 of 103 gates healthy) but leads both quality and LTE: median SINR +12.5 dB (103 healthy gates of 103 — the most of any carrier), and best-serving LTE at 76 of 103 gates with a healthy venue LTE median of -90.0 dBm.

New in this window: Verizon takes best-NR honors across Concourse B — 17 of 17 B gates — while AT&T holds the Alaska hub (C and N). Two facts complicate the simple macro-spillover read. First, Verizon runs the densest macro grid around the airport in the Site Finder layer (§9.3: 112 estimated site-layer centroids — 57 LTE + 55 NR — nearest 550 m from the terminal reference point). Second, Verizon's tenant medians are INDOOR-stronger — indoor -90.4 dBm vs outdoor -96.5 dBm (-6.0 dB, §5.2) — the opposite of a spillover signature. No Verizon in-building system is recorded in the airport graph; the pattern is consistent with either unusually effective close-in macro penetration or an unrecorded independent in-building path. That is an attestation question, not a measurement one — and it should be answered before the Boldyn cutover decommissions legacy systems unexamined.

Verizon framed finding
LTE network of record (76 of 103 gates), cleanest 5G quality, indoor-stronger tenant medians, and no recorded in-building system to explain it. Attest the path before the neutral-host award decommissions it unexamined.

3.3 T-Mobile US — the carrier the neutral-host cutover most helps

T-Mobile delivers the weakest indoor 5G: median -97.9 dBm, healthy at only 17 of 103 gates (17%), SINR median +9.4 dB, and worst carrier at 93 of 103 asymmetry-ranked gates (§10). This is the inverse of a neutral-host venue profile and is consistent with T-Mobile having no in-building path at SEA today — macro spillover against AT&T's dedicated DAS.

By definition the incoming Boldyn neutral-host system hosts all three carriers; T-Mobile's indoor numbers are the ones most likely to move at cutover, and this baseline is how that movement gets proven (§14).

T-Mobile framed finding
No in-building path: 17% of gates healthy and worst-carrier at 93 of 103 asymmetry gates. The hosted path is the single largest measurable lift available at cutover.

3.4 Sub-1 GHz Reliance

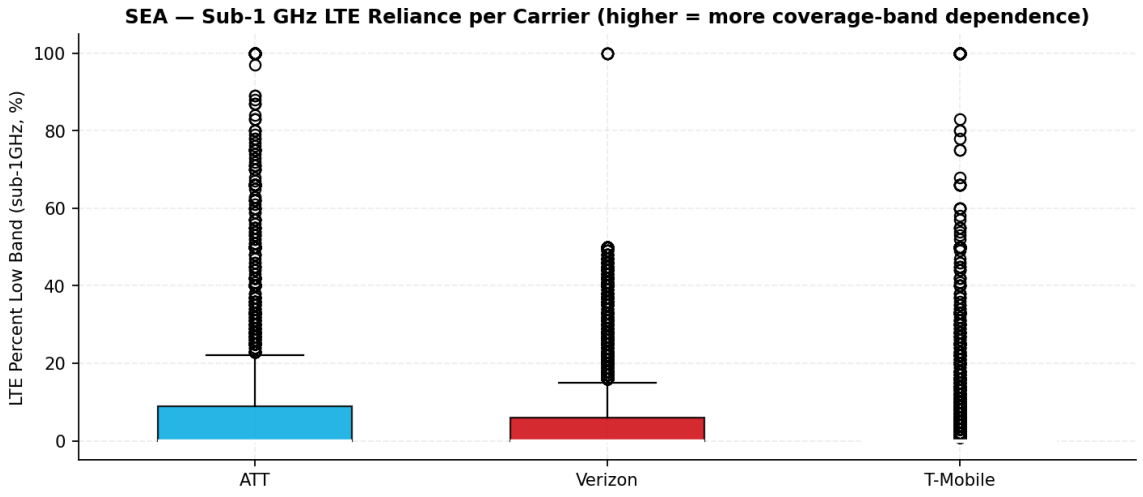

FIG. 3 — LTE percent-low-band distribution per carrier. Higher = more reliance on sub-1 GHz coverage bands (600/700/850 MHz), which carry into buildings but offer lower capacity. · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

The percent-low-band statistic is an indirect indicator of in-building dependence: a carrier whose tiles disproportionately attach to sub-1 GHz spectrum is leaning on coverage-grade bands because higher-capacity mid-band is not reaching the tile reliably. The distribution is consistent with the per-carrier story above.

3.5 RSRQ, Channel Quality (CQI), and Optimization Priority

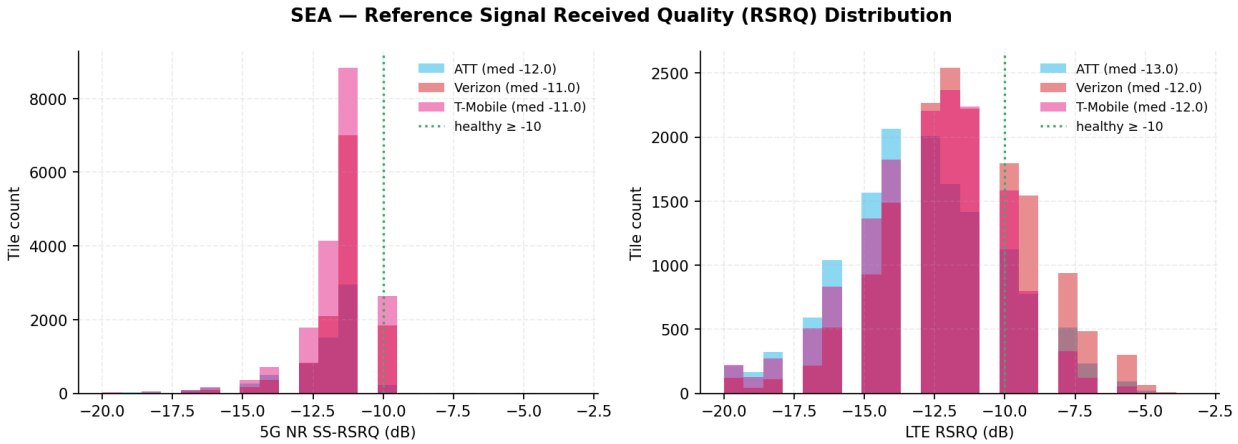

FIG. 4 — NR and LTE RSRQ distributions per carrier. · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

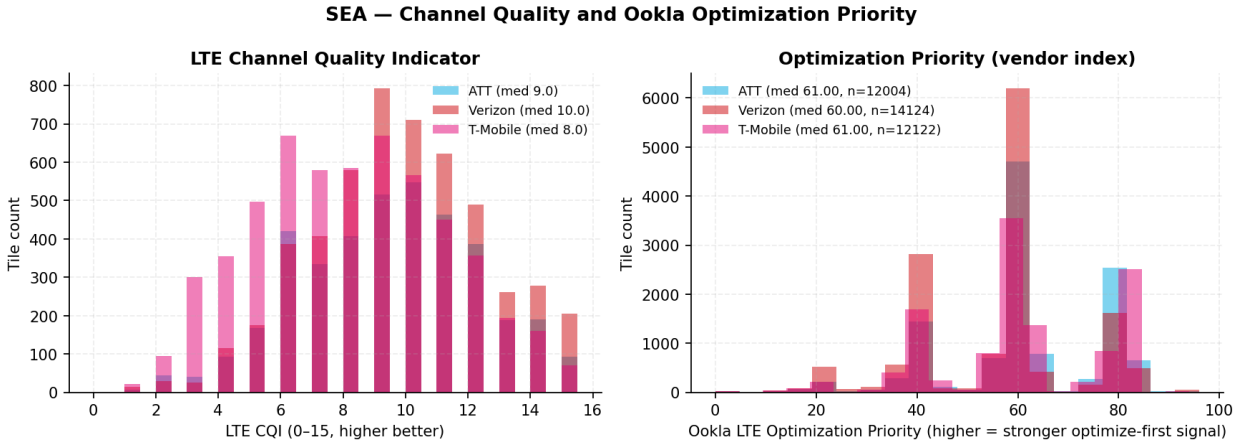

FIG. 5 — LTE CQI distribution and Ookla's LTE Optimization Priority index (vendor layer, present in this export — new this revision). · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

CQI corroborates the SINR ordering; RSRQ only partly. Verizon is again cleanest, but AT&T posts the WORST RSRQ distributions of the three (NR median -12.0 dB vs Verizon -11.0 / T-Mobile -11.0; LTE -13.0 vs -12.0 / -12.0) despite healthy SINR. Because RSRQ degrades as subframe utilization rises, weak RSRQ on a strong-RSRP, healthy-SINR network is consistent with a heavily loaded serving layer — an inference, not a measurement (§16), but one that puts a capacity question mark next to the AT&T DAS the §14 parity bar should carry.

New this revision: the export carries Ookla's LTE Optimization Priority — the vendor's own index for tiles where signal is strong but quality is poor, the optimize-first flag. Venue medians: AT&T median 61 (n=12004); Verizon Wireless median 60 (n=14124); T-Mobile US median 61 (n=12122) — near-

identical, so the discriminating signal is in the distribution tails (FIG below), not the medians. In the MIA rev-2 report this layer was still a queued portal pull; at SEA it is measured.

3.6 Serving-Cell Volatility (Handover-Churn Proxy)

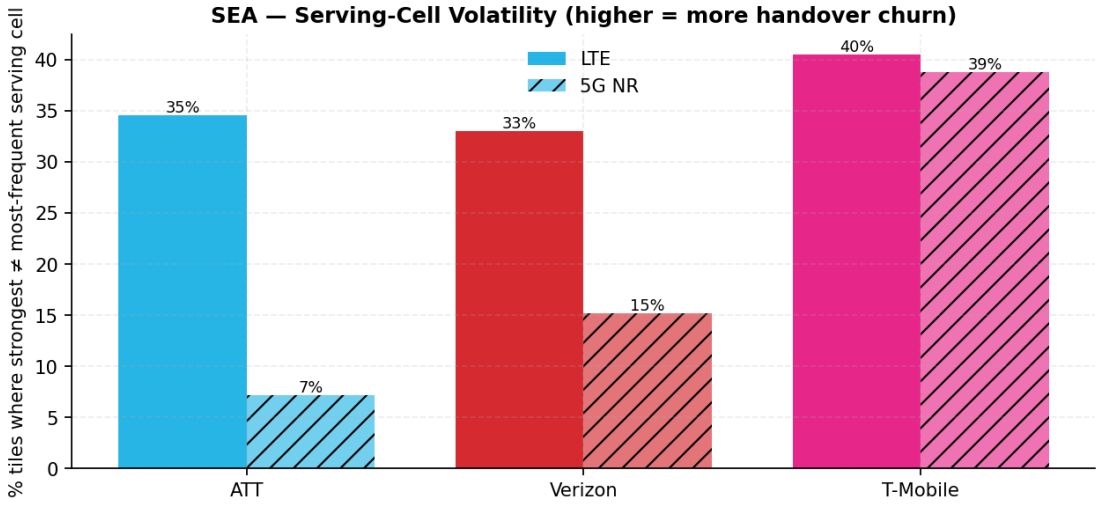

FIG. 6 — Share of tiles where the strongest observed cell differs from the most-frequent serving cell. Proxy for handover instability and dominance conflict. · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

Where the strongest cell at a tile is not the most-frequently-serving cell, the network is hand-keying between competing cells. Measured churn: AT&T LTE 35% / NR 7%; Verizon Wireless LTE 33% / NR 15%; T-Mobile US LTE 40% / NR 39%. In a venue mid-transition from single-carrier DAS to neutral host, churn differences reflect how each carrier's indoor and macro layers interact today. This is a proxy, not a handover trace (§16).

4. The View by Zone

4.1 Healthy Share and Median RSRP by Concourse

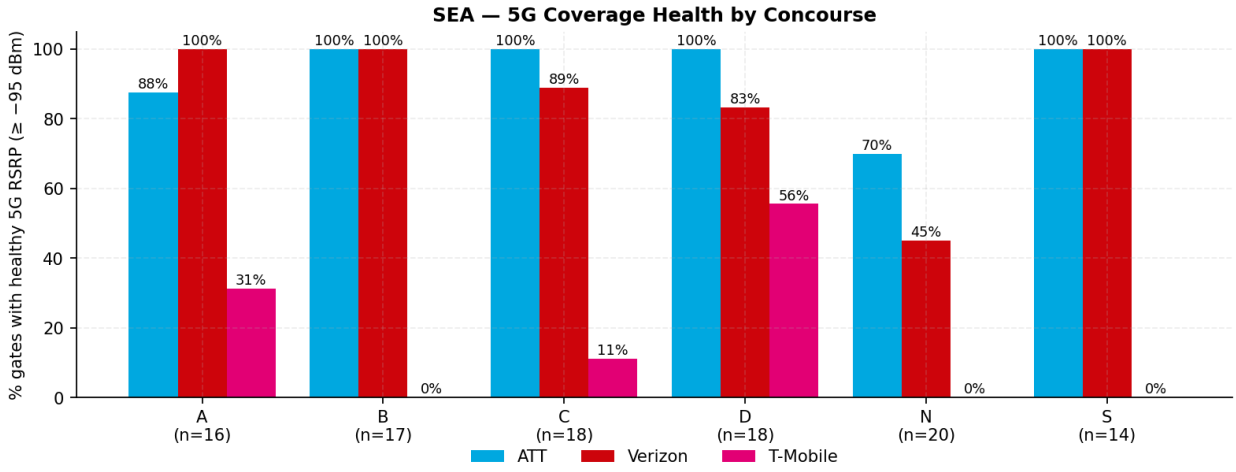

FIG. 7 — Share of gates with healthy 5G RSRP by concourse (n per concourse on axis). · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

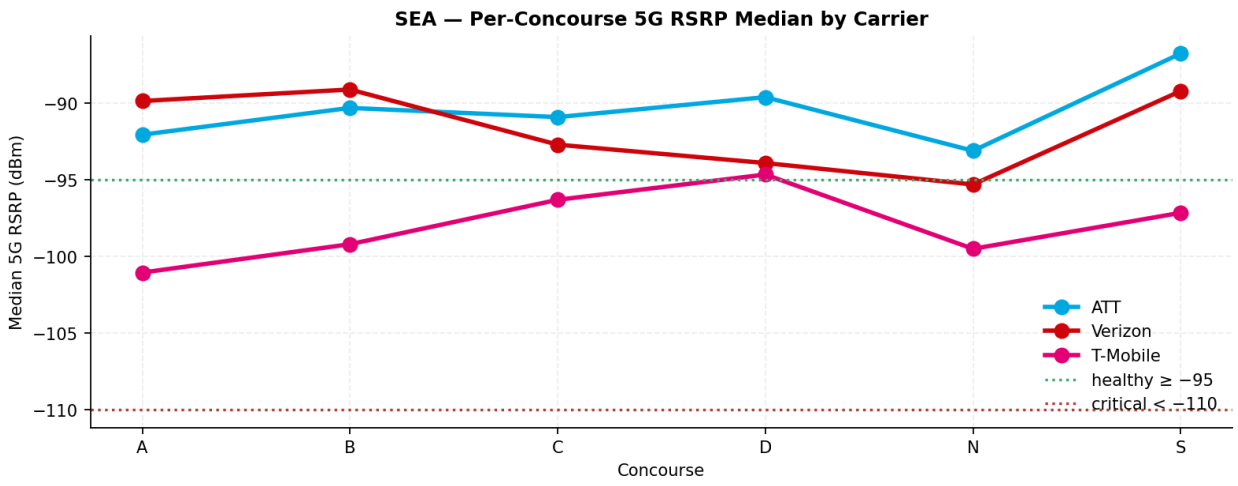

FIG. 8 — Per-concourse median 5G RSRP per carrier. · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

4.2 Coverage Class and PCI Diversity

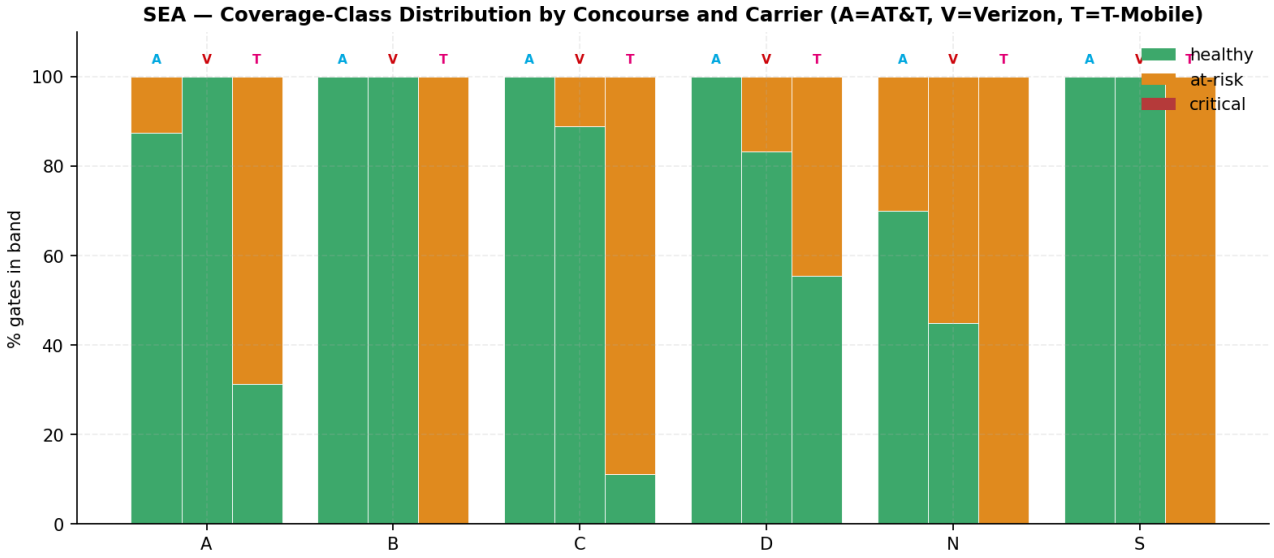

FIG. 9 — Coverage-class distribution by concourse and carrier (A=AT&T, V=Verizon, T=T-Mobile). · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

Critical-band gates (<−110 dBm) by carrier: AT&T 0, Verizon Wireless 0, T-Mobile US 0 of 103 gates. The stacked view shows where each carrier's healthy share concentrates; the at-risk band dominates T-Mobile across most concourses, while AT&T holds majority-healthy distributions in the Alaska hub.

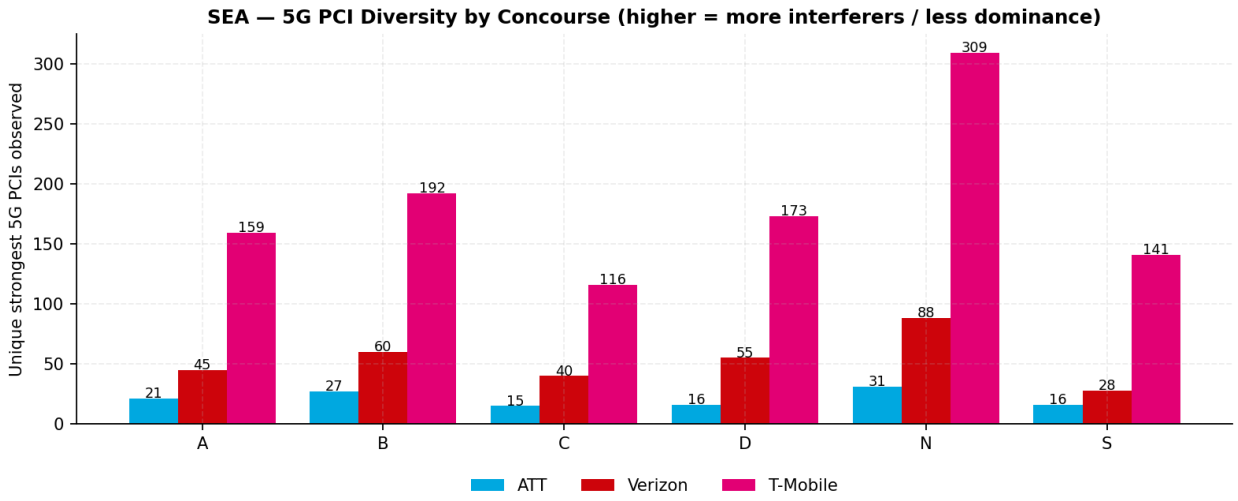

FIG. 10 — Unique strongest-serving PCIs per concourse per carrier. Reads in both directions — always paired with SINR (§16). · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

For AT&T, the indoor PCI structure reflects the dedicated DAS; for T-Mobile, the indoor PCI picture reflects macro spillover rather than a hosted in-building source.

4.3 Cross-Carrier Concordance — Building Problem or Carrier Problem

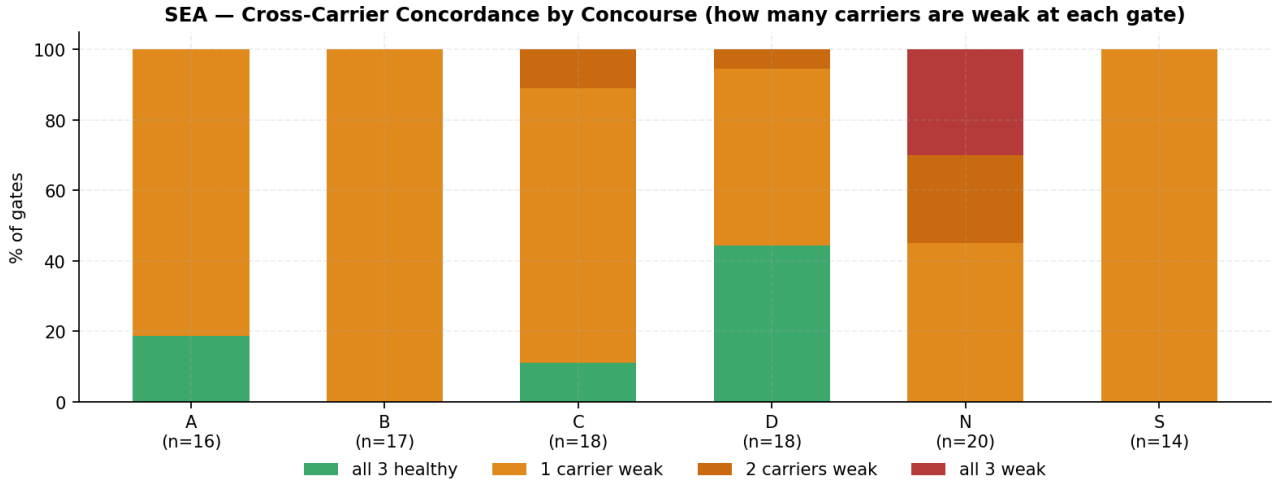

FIG. 11 — Per concourse: how many of the three carriers are below the healthy line at each gate. New section this revision (VNIR §4.3). · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

This is the split that decides who pays. A gate weak for all three carriers is a building, geometry, or propagation problem — the neutral-host system's job. A gate weak for exactly one carrier is that carrier's path problem. At SEA the dominant pattern is one-or-two-carriers-weak with AT&T healthy — a carrier-path problem concentrated in T-Mobile (and situationally Verizon), which is precisely the gap a hosted neutral-host path closes. Zones showing all-three-weak gates price as propagation problems and belong in the Boldyn design review.

4.4 Alaska Hub — Concourse C + North Satellite (N)

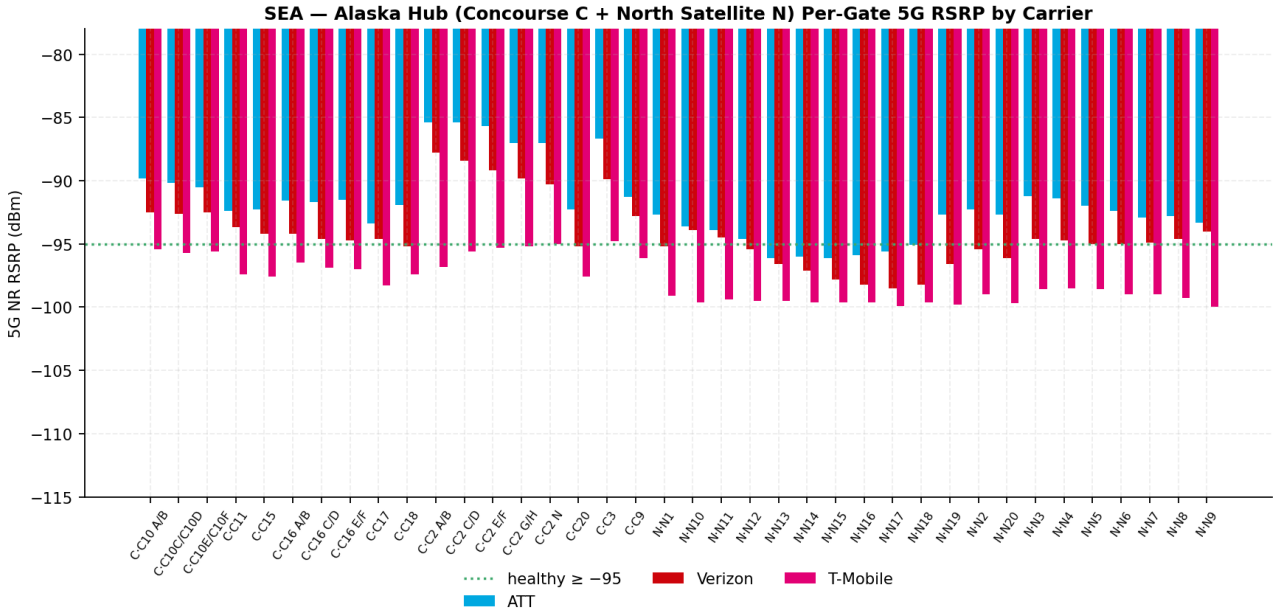

FIG. 12 — Per-gate 5G RSRP across the 38 Alaska-hub gates (C + N). SEA is Alaska Airlines' primary hub; C expanded June 2026, N is Alaska-exclusive. · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

The Alaska hub is SEA's dominant single-airline cluster (38 gates). AT&T is best-NR at 38 of 38 hub gates with NR data and healthy at 32 of 38. T-Mobile and Verizon coverage in C and N should be named acceptance criteria in the Boldyn test plan (§14) — those are the carriers riding macro spillover in the hub today.

4.5 South Satellite (S) — International

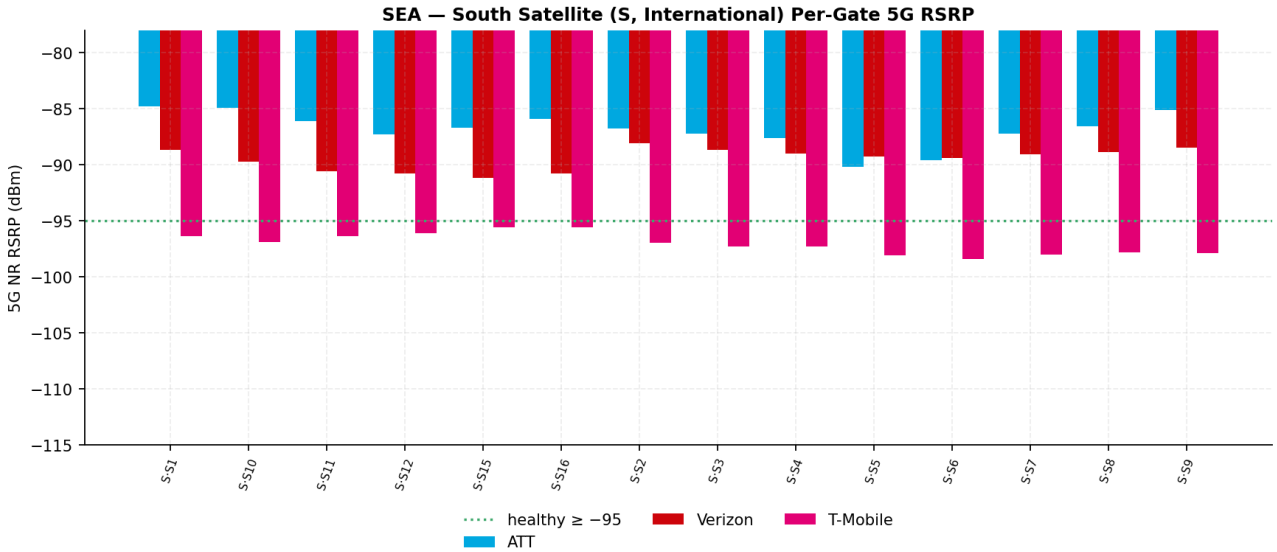

FIG. 13 — Per-gate 5G RSRP across the 14 South Satellite gates — foreign-flag carriers plus Delta international. · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

The South Satellite hosts international premium-cabin traffic — the passengers with the highest expectations and the least tolerance for a dead zone at the gate. Best-NR split across its 14 gates: AT&T

12, Verizon Wireless 2. Carrier coverage in S belongs in the post-cutover validation set for the high-value-passenger narrative.

5. Tenant Level

5.1 Category Signal Strength and Quality

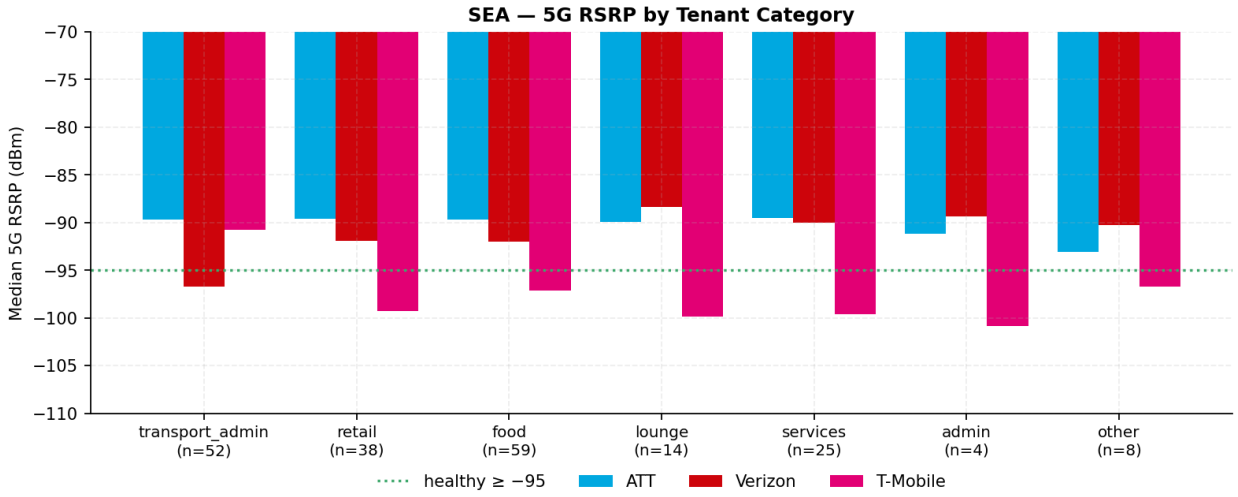

FIG. 14 — Median 5G RSRP by tenant category (n per category on axis). · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

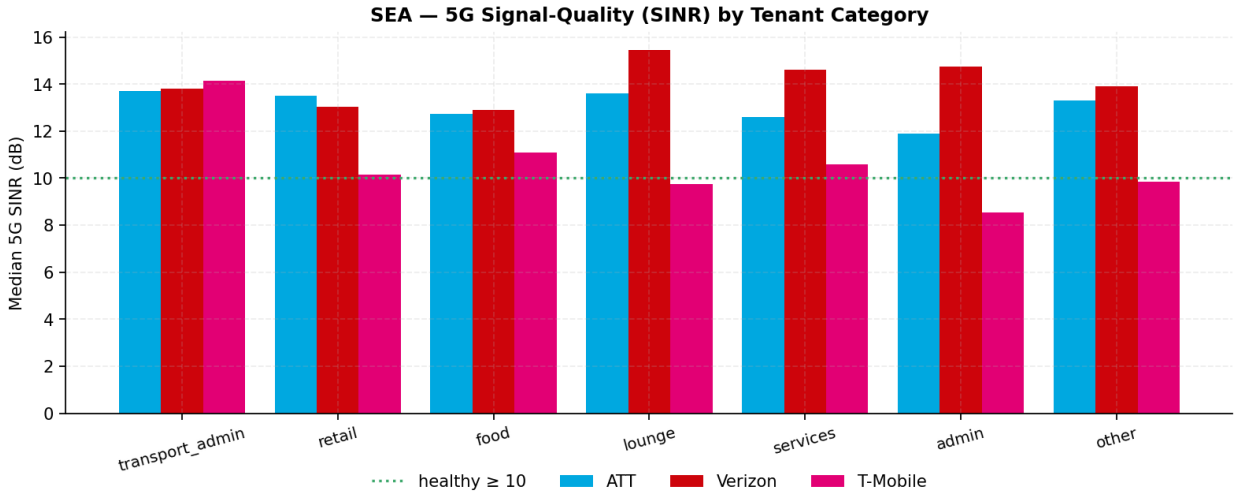

FIG. 15 — Median 5G SINR by tenant category. · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

Read together: AT&T leads indoor categories (the DAS signature), Verizon's clean quality shows across categories, T-Mobile trails indoors. Read this as a pattern, not a per-category ranking — several category bins run below the n ≥ 30 floor (admin n=4, services n=25, lounge n=14 tenants); per-row n is published in Appendix A and the axis labels.

5.2 Indoor vs Outdoor — the Donor-Isolation Diagnostic (proxy)

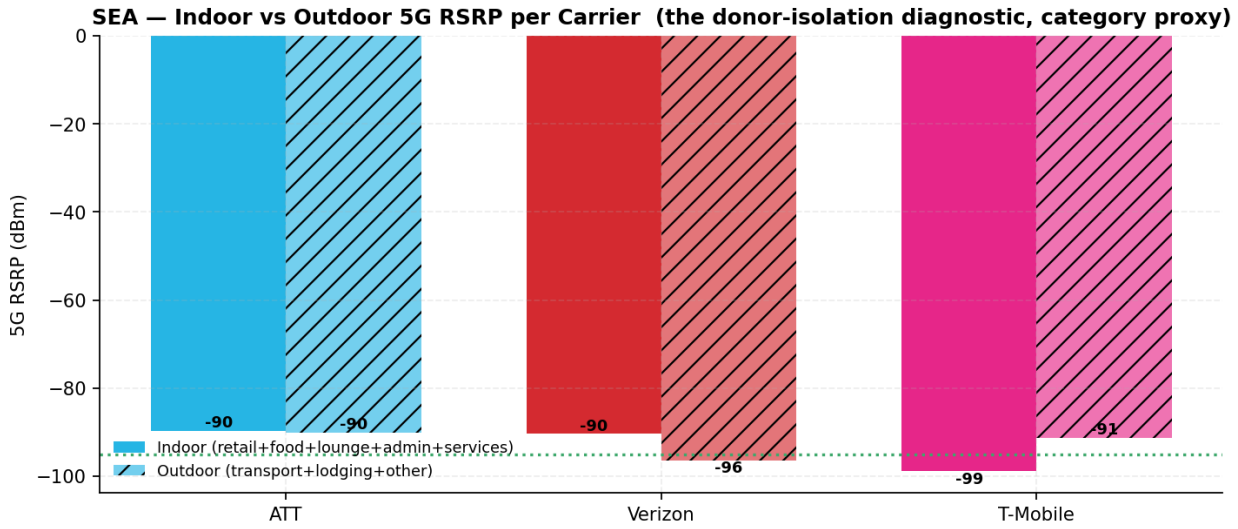

FIG. 16 — Per-carrier median RSRP, indoor tenant categories vs outdoor categories. PROXY: category-based masking, not Ookla's native building-polygon indoor mask (queued in §15). · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

- AT&T: outdoor -90.1 dBm (n=63) → indoor -89.7 dBm (n=137), delta -0.4 dB
- Verizon Wireless: outdoor -96.5 dBm (n=62) → indoor -90.4 dBm (n=140), delta -6.0 dB
- T-Mobile US: outdoor -91.3 dBm (n=63) → indoor -98.9 dBm (n=140), delta +7.6 dB

A large positive outdoor-minus-indoor delta is the macro-spillover signature; a flat or negative delta is consistent with a dedicated in-building source. The three carriers land on three different signatures: AT&T near-flat (the DAS), T-Mobile +7.6 dB outdoor-stronger (macro spillover), and Verizon -6.0 dB indoor-STRONGER — the anomaly §3.2 flags for attestation. Sample-floor disclosure: any bucket below n = 30 would be shown as indicative only; in this window every bucket clears the floor (smallest n = 62). The native indoor building-polygon mask (§15) remains the measurement-grade replacement for this category proxy.

5.3 Airline Gate Clusters

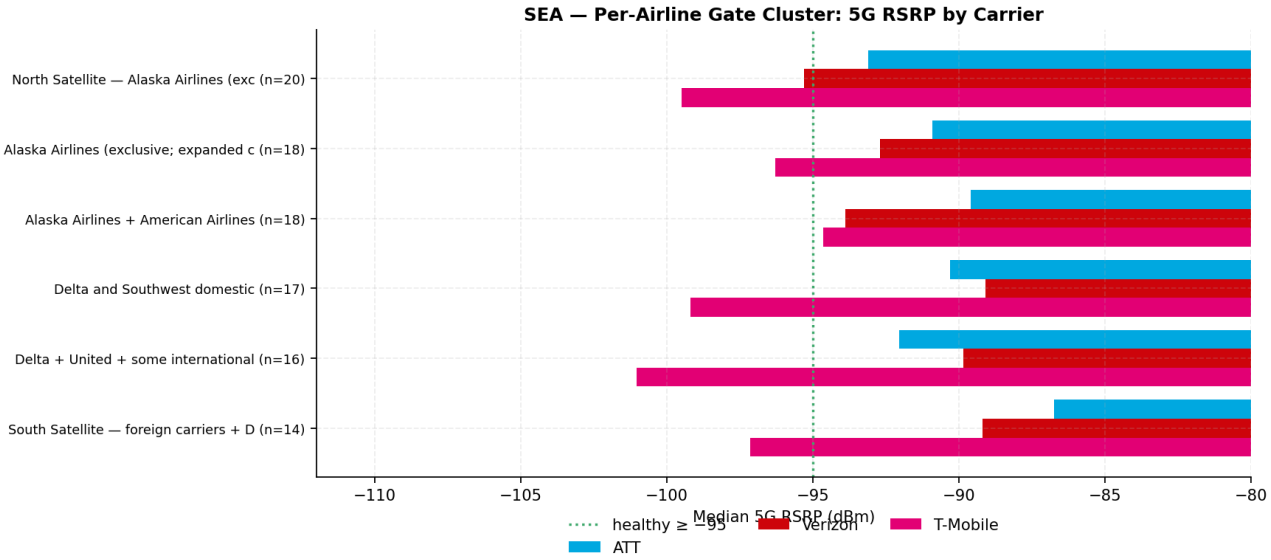

FIG. 17 — Top tenant operators by gate count, with per-carrier median RSRP at each operator's gates (n on axis). · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

Alaska Airlines is the dominant operator (Concourse C, North Satellite, shared D). For an airline, today's device performance at its gates is a function of concourse and carrier more than airline — the cluster chart is how an airline reads its own exposure.

5.4 Retail and F&B Brand Coverage

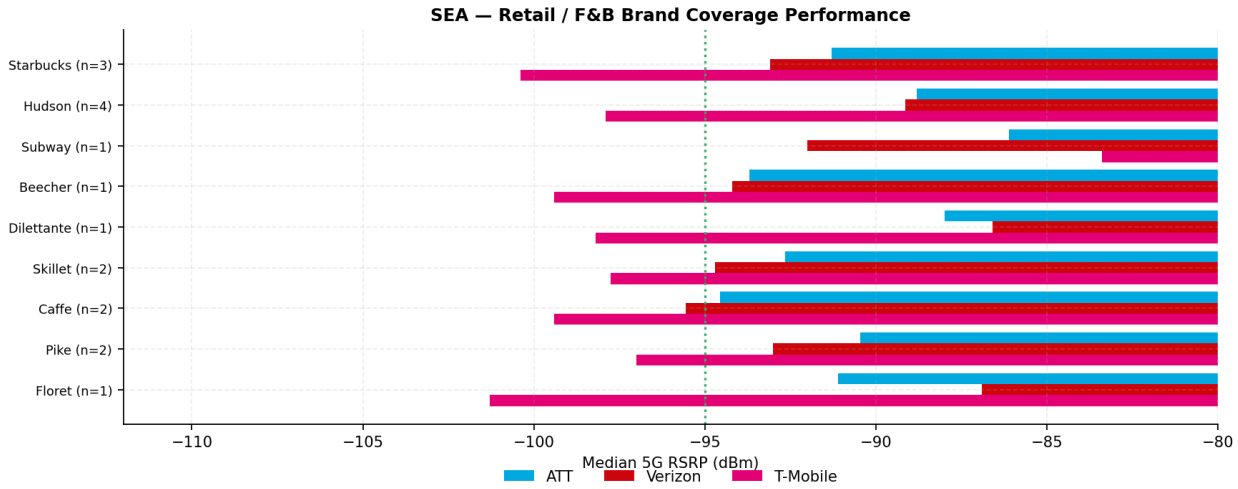

FIG. 18 — Per-brand median 5G RSRP across multi-location brands. Small per-brand n — consistency check, not ranking ($16). · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

Multi-location brands are a natural cross-zone consistency check: coffee and quick-service brands cluster around carrier medians matching the venue-wide pattern. This is the resolution for a defensible per-store conversation, not a league table.

5.5 Airline Lounges

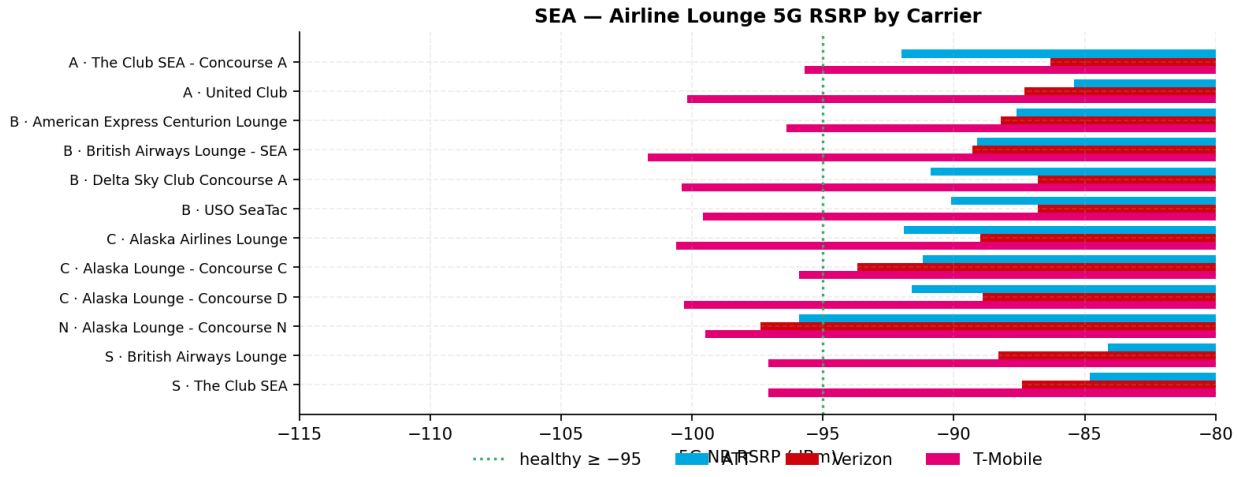

FIG. 19 — Per-lounge 5G RSRP per carrier (single-point aggregates; n per lounge in Appendix C). · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

12 named airline and premium lounges have measurable data (Alaska Lounges, Delta Sky Club, The Club SEA, United Club, British Airways Lounge, USO, and others). Best-serving 5G counts: AT&T 7, Verizon

Wireless 5 (n = 12 lounges — a disclosed count, not a ranked claim). The Alaska Lounges in the hub (C, N) and the international lounges in S are the premium rooms where carrier coverage matters most.

6. Load and Usage Intensity

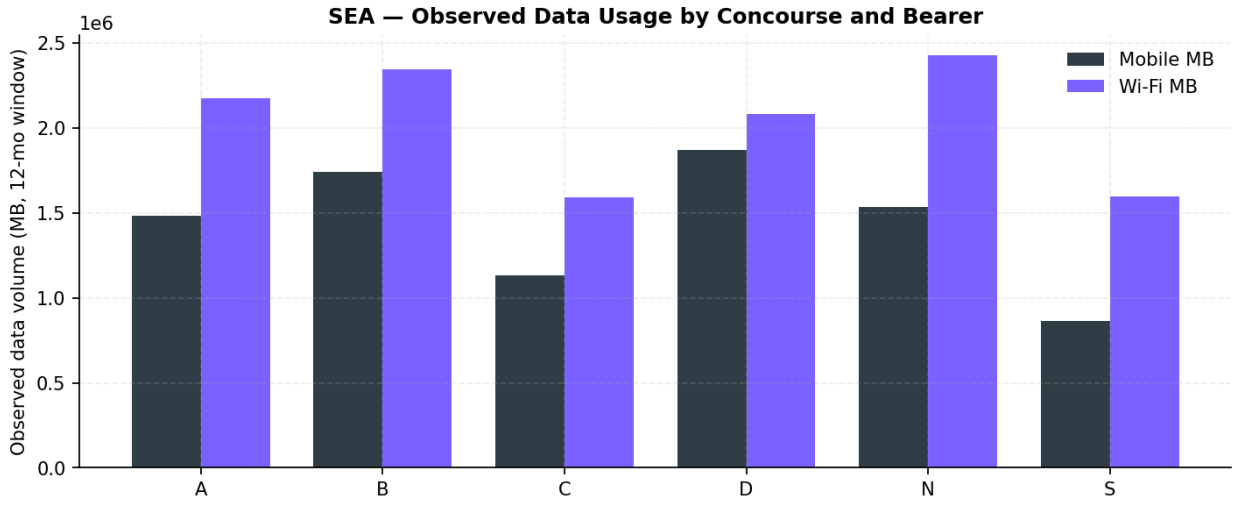

FIG. 20 — Observed data volume by concourse and bearer (MB over the 12-month window). · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

Usage volume is the demand signal this export carries: where bandwidth is actually consumed, by bearer, by zone. The concourses with the largest observed volumes are where weak signal exposes the most passenger-hours.

What this export does NOT carry: Ookla's User Density layer — the count of unique Android devices per bin over the window (deduplicated; NOT concurrent users, NOT dwell time). Until that layer is pulled ($15), this report makes no device-count or density claim.

7. Wi-Fi as an Augmentation Layer

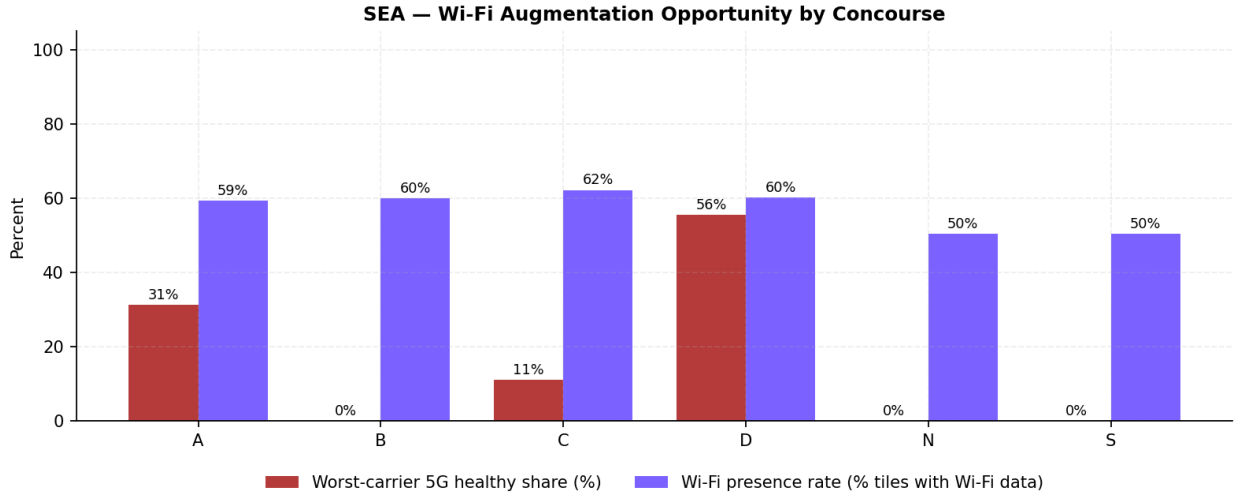

FIG. 21 — Worst-carrier 5G healthy share vs Wi-Fi presence rate by concourse. · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

Wi-Fi usage is observed at 64% of measured tiles — locked basis, one convention across all artifacts: the 53,055 carrier-panel rows deduplicate to 26,819 unique tile centroids, of which 21,306 report the Wi-Fi field (79%); among reporting tiles, 64% show Wi-Fi usage above zero from any panel. Non-reporting tiles are excluded from the denominator (absence of a reading is absence of measurement). The augmentation opportunity is largest where cellular is weakest on the worst-served carrier and Wi-Fi presence is high.

7.1 Offload Share (venue and zone level only)

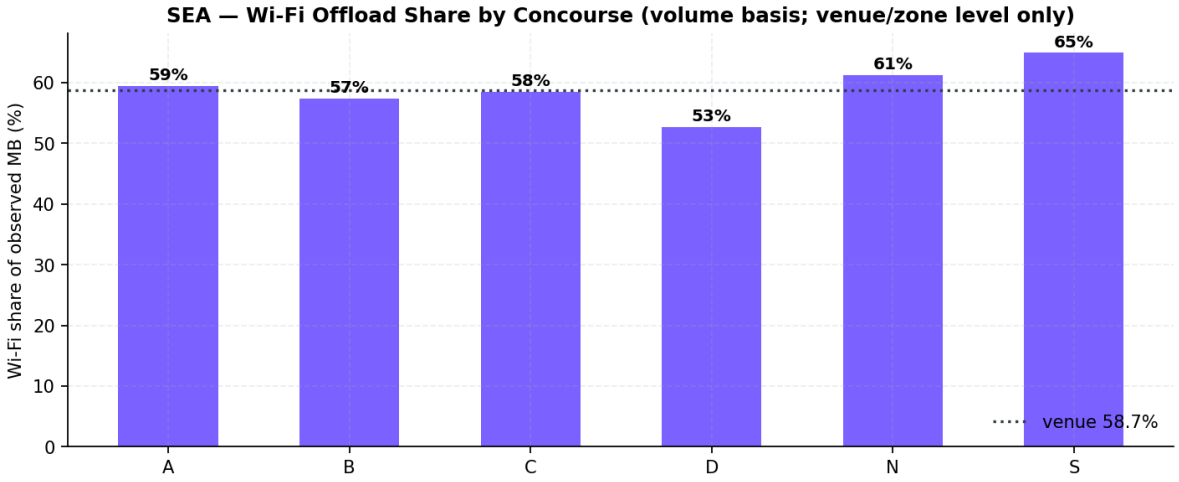

FIG. 22 — Wi-Fi share of observed data volume by concourse; venue reference line. New section this revision — rev 1 published no offload figure. · Source: Ookla Cell Analytics tile export, 2025-08-01 – 2026-07-31

Venue-wide, 58.7% of observed data volume moves over Wi-Fi (Σ Wi-Fi MB ÷ Σ all MB, summed across the three carrier sampling panels — usage fields are panel-scoped, so this is a sample-weighted blend, stated as such). Locked rule (§16): offload is computed at venue and zone level ONLY — the export does not attribute Wi-Fi usage to any cellular carrier's subscribers, so per-carrier offload is not derivable at any aggregation and is never implied here. The figure blends airport-run Wi-Fi with tenant and personal networks; it cannot separate them.

Scope decomposition: tiles within 500 m of a concourse point blend to 58.6% offload; the remaining on-airport tiles (landside, garages, periphery) run 70.9% Wi-Fi, pulling the venue figure to 58.7%.

7.2 Tenant-Level Wi-Fi Footprint

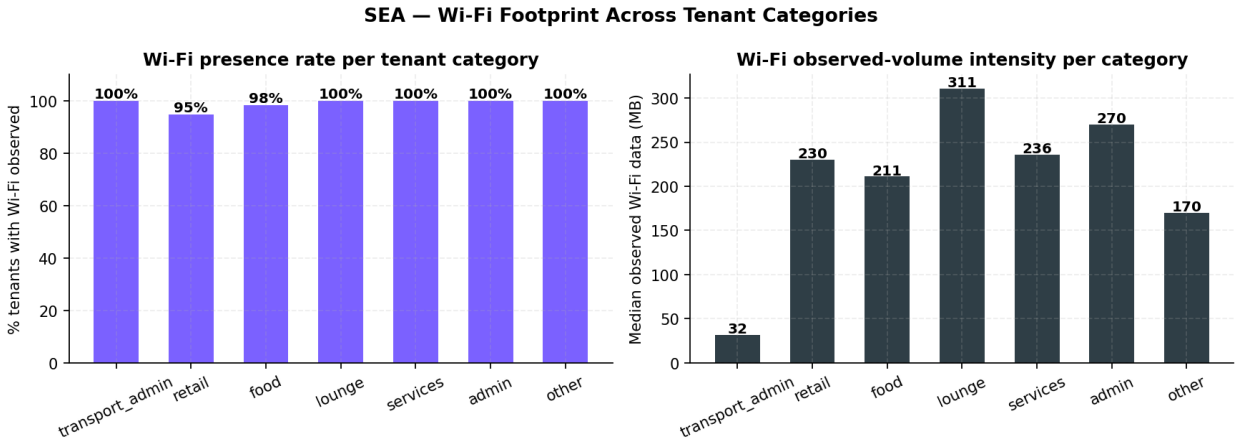

FIG. 23 — Wi-Fi observation rate and intensity across tenant categories. · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

Wi-Fi presence and observed volume peak where passengers dwell (food, lounge). No Wi-Fi technology node is recorded for SEA in the airport graph — the Wi-Fi figures here come solely from the Ookla observed-usage layer; controller telemetry (§15) would convert presence into capacity.

7.3 Lounges — Cellular vs Wi-Fi

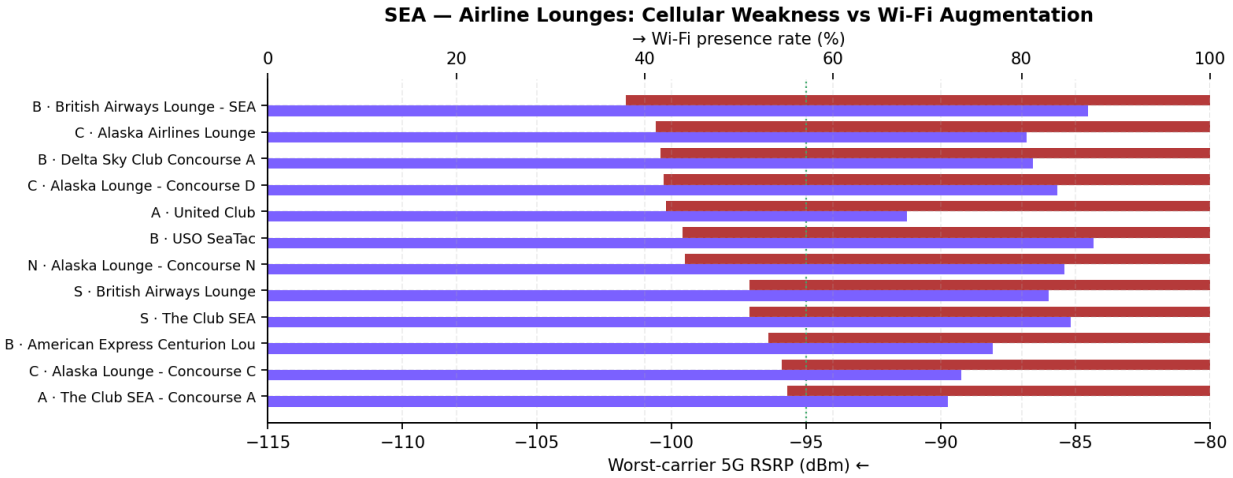

FIG. 24 — Per-lounge worst-carrier 5G RSRP against Wi-Fi presence rate. · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

Lounge	Worst-carrier 5G RSRP	Wi-Fi presence rate
B · British Airways Lounge - SEA	-102 dBm	87%
C · Alaska Airlines Lounge	-101 dBm	81%
B · Delta Sky Club Concourse A	-100 dBm	81%
C · Alaska Lounge - Concourse D	-100 dBm	84%
A · United Club	-100 dBm	68%
B · USO SeaTac	-100 dBm	88%
N · Alaska Lounge - Concourse N	-100 dBm	85%
S · British Airways Lounge	-97 dBm	83%
S · The Club SEA	-97 dBm	85%
B · American Express Centurion Lou	-96 dBm	77%
C · Alaska Lounge - Concourse C	-96 dBm	74%
A · The Club SEA - Concourse A	-96 dBm	72%

Lounges with low worst-carrier RSRP but high Wi-Fi presence are the rooms where Wi-Fi likely keeps the experience usable today for subscribers on the under-performing carrier — an operational positive to sustain, not a reason to under-invest in the cellular transition.

8. Private Wireless

The airport graph attests only DAS technology at SEA — no CBRS, Wi-Fi, private-5G, or public-safety deployment nodes (a graph-coverage statement, not a claim that none exist physically). The public Ookla layer does not characterize private networks. Whether a CBRS private-network layer is scoped alongside the Boldyn neutral-host build — for airport operational workloads the public layers are not designed for — is a design question for the Port; typical large-hub workloads:

Workload	Why a PWN fits	Coordination required
Baggage handling system (BHS)	Deterministic latency, contained RF,	Facilities, BHS vendor

instrumentation	isolation from passenger traffic	
Ramp and ground-service vehicle telematics	Outdoor airside coverage with controlled SIM provisioning	Airside Operations
Push-to-talk and operational voice	QoS-guaranteed voice independent of public carriers	Public Safety, ground handlers
Fixed cameras and IoT in non-public areas	Bandwidth without consuming public-carrier capacity	Facilities Maintenance
Satellite-transit (STS) telemetry and CCTV	Stable connectivity between main terminal and satellites	Transit Maintenance
Federal inspection / Global Entry devices	Isolated network for federal device workflows	CBP IT, Port of Seattle

9. Spectrum, Service Availability, and Macro-Site Geometry

9.1 Band Distribution

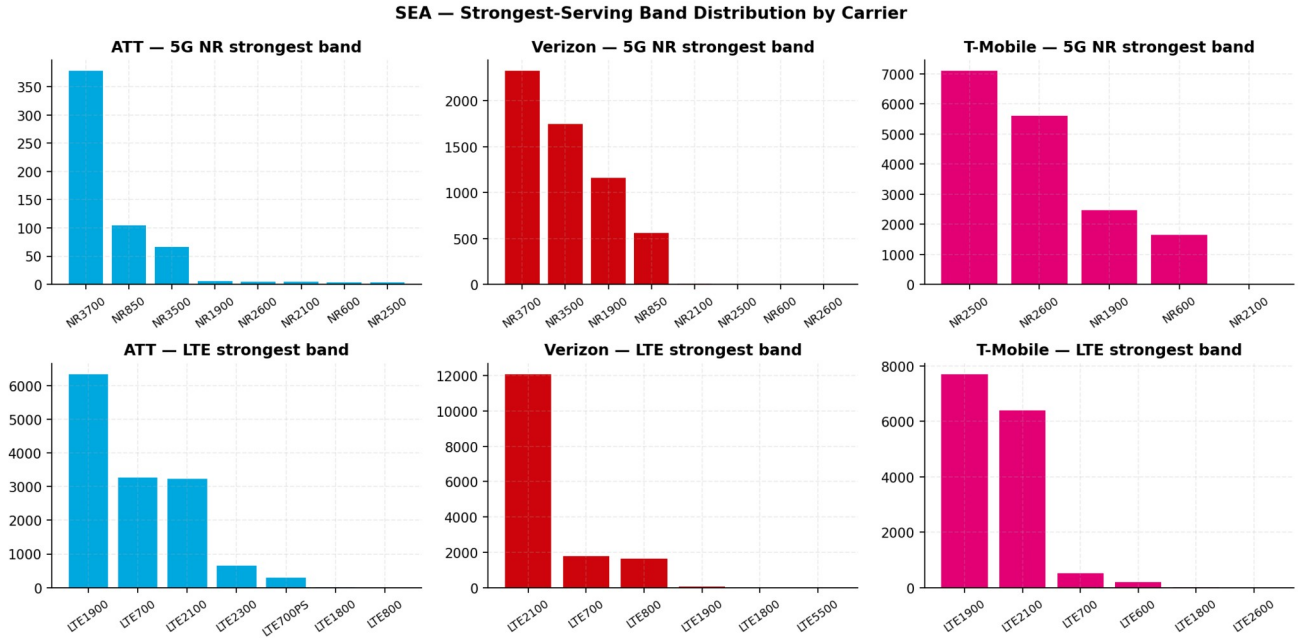

FIG. 25 — Strongest-serving band distribution per carrier, 5G NR and LTE (n = tile counts in tables). · Source: Ookla Cell Analytics tile export, 2025-08-01 – 2026-07-31

The bands a tile attaches to most often reveal which spectrum each carrier actually puts to work inside the building: sub-1 GHz reliance implies coverage-grade attachment; mid-band reliance implies a dedicated indoor source or unusually strong penetration.

AT&T:

NR band	Tiles (n)	LTE band	Tiles (n)
NR3700	378	LTE1900	6342
NR850	104	LTE700	3269
NR3500	66	LTE2100	3230
NR1900	6	LTE2300	661
NR2600	5	LTE700PS	303
NR2100	5	LTE1800	21

Verizon Wireless:

NR band	Tiles (n)	LTE band	Tiles (n)

NR3700	2325	LTE2100	12094
NR3500	1748	LTE700	1792
NR1900	1158	LTE800	1658
NR850	560	LTE1900	62
NR2100	8	LTE1800	3
NR2500	3	LTE5500	2

T-Mobile US:

NR band	Tiles (n)	LTE band	Tiles (n)
NR2500	7097	LTE1900	7707
NR2600	5606	LTE2100	6394
NR1900	2461	LTE700	527
NR600	1643	LTE600	201
NR2100	1	LTE1800	21

9.2 Service Availability

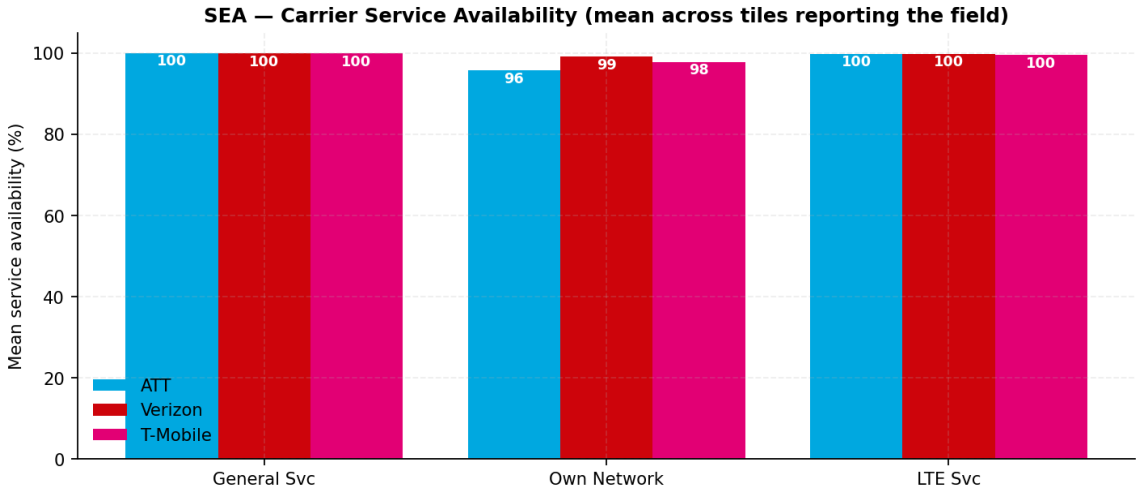

FIG. 26 — Service availability — General, Own Network, General LTE — mean across tiles reporting the field. · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

On reporting tiles, all three carriers show near-universal LTE service availability — the graceful-degradation floor. Basis disclosure: availability fields are not populated on every tile (General-LTE reporting share: AT&T 77%, Verizon Wireless 84%, T-Mobile US 86%); the mean is over reporting tiles only, and absence of a reading is absence of measurement.

9.3 Macro-Site Geometry (Ookla Site Finder) — NEW this revision

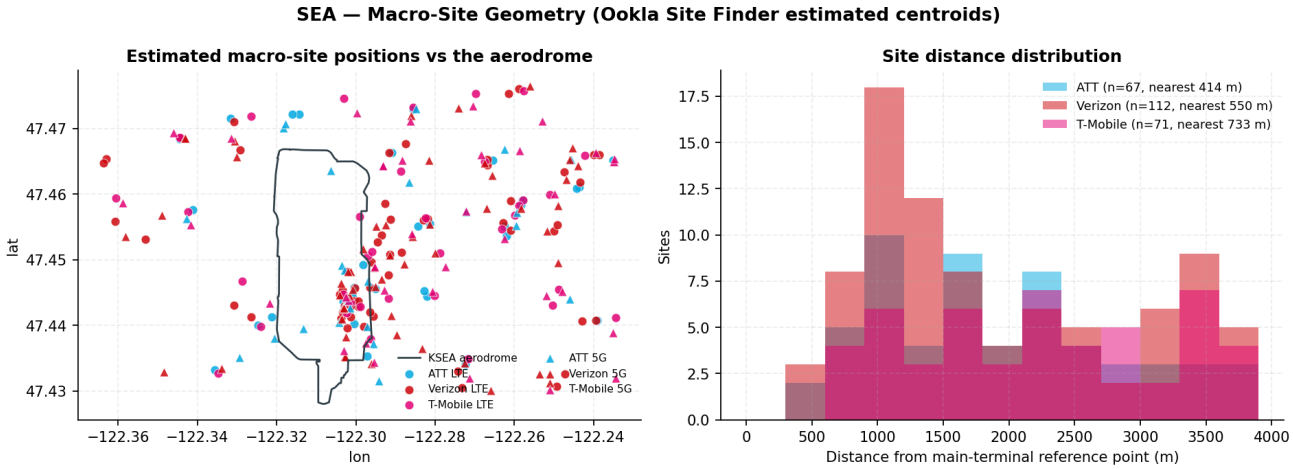

FIG. 27 — Estimated macro-site centroids vs the KSEA aerodrome, and per-carrier distance distributions. · Source: Ookla Site Finder centroid export, captured 2026-08-25 00:38 UTC (2026-08-24 17:38 PDT)

Carrier	LTE layer (n)	5G layer (n)	On/adjacent airport	Nearest to terminal	Median distance
AT&T	32	35	30	414 m	2033 m
Verizon Wireless	57	55	35	550 m	2190 m
T-Mobile US	35	36	14	733 m	2756 m

Site Finder centroids are Ookla's crowdsource-estimated macro positions — estimates, not carrier registry data (disclosed in §16) — and they are TECHNOLOGY-LAYER centroids: an LTE eNodeB and a 5G gNodeB on the same structure appear as two entries, and carriers co-locate the two layers heavily, so the 124+126 layer counts must not be read as 250 distinct towers. Scope note: all figures on this page are big-3 only; the export also contains 3 other-network 5G entries (Cellcom US, GCI, UScellular) excluded from every big-3 number. 79 of the 250 big-3 layer centroids sit on or immediately adjacent to airport property. In the MIA report this layer was queued as a next pull; at SEA it is held, which means the §3 carrier stories can be read against actual feeder geometry: which carriers serve the terminal from close-in macros versus distant ones, and where a hosted in-building path replaces distance with design.

10. Carrier-Asymmetry Atlas

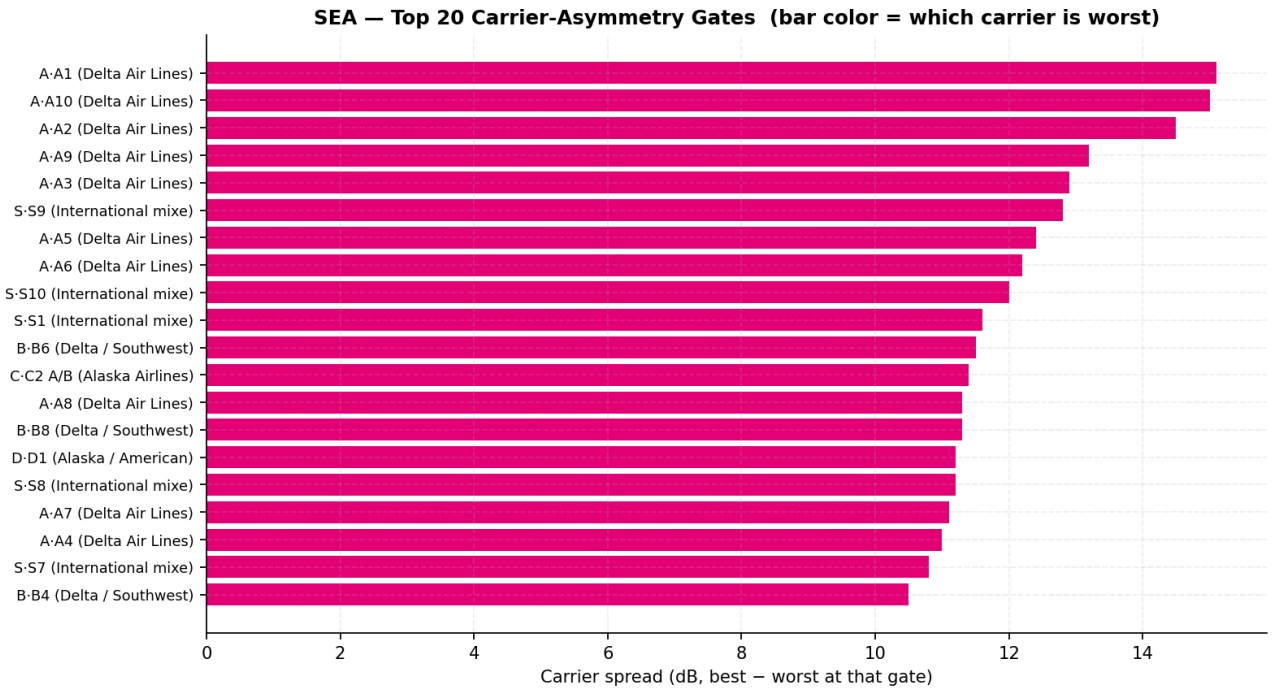

FIG. 28 — Top 20 gates by best-minus-worst carrier 5G RSRP spread; bar color = worst carrier at that gate. · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

These 20 gates are where a passenger's experience varies most by carrier (spreads of 10–15 dB). Worst-carrier tally across all ranked gates: T-Mobile US 93, AT&T 5, Verizon Wireless 5. They serve two purposes: worst-case examples for the stakeholder narrative, and the proposed validation-point list for post-cutover acceptance testing (§14). A neutral-host design should compress this spread; that compression is the cleanest measurable success criterion available.

11. Federal and Operational-Critical Tenants

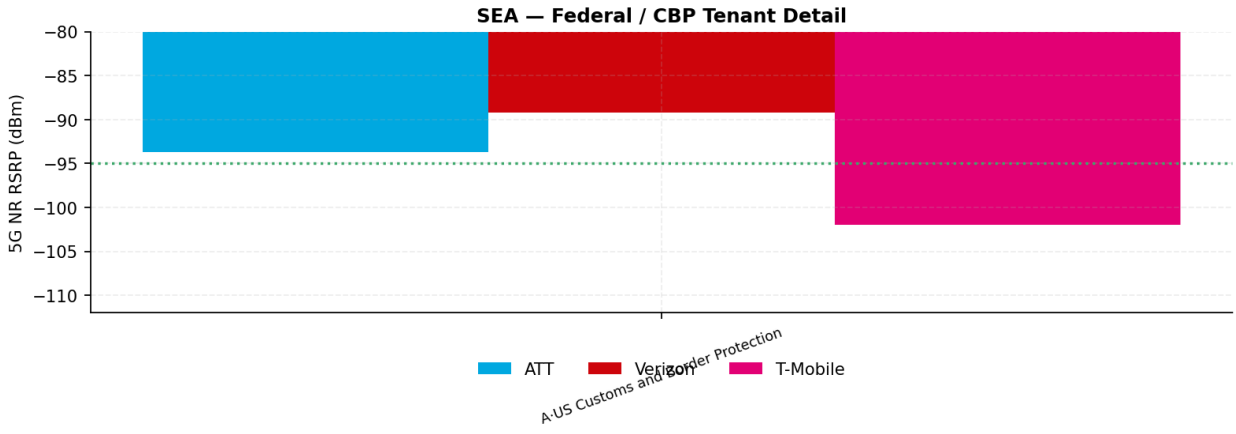

FIG. 29 — Per-carrier 5G RSRP at federal / CBP tenant locations (n = 1 named location — small footprint, reported for scope, not ranked). · Source: Ookla Cell Analytics tile export, 2025-08-01 → 2026-07-31

SEA's federal-tenant footprint identifiable by name in the public dataset is small (1 location). US Customs and Border Protection - Global Entry Enrollment center (Concourse A) reads AT&T -93.7 dBm

(healthy); Verizon Wireless -89.2 dBm (healthy); T-Mobile US -102.0 dBm (at-risk). A fuller federal-zone picture (the South Satellite FIS hall) requires additional tenant attestation; for engagement with federal stakeholders this is where the measurement-grounded conversation begins.

12. Passenger-Impact Translation

Carrier	Gates below healthy 5G	Share of gates	Illustrative annual enplanements at those gates*
AT&T	8 of 103	8%	≈ 2.0M
Verizon Wireless	16 of 103	16%	≈ 3.9M
T-Mobile US	86 of 103	83%	≈ 21.2M

*Translation method, stated plainly: SEA handles ~25.4M annual enplanements (KG record, cited-not-held). Per-gate volumes are NOT held, so the last column distributes enplanements uniformly across measured gates as an explicit proxy — an order-of-magnitude translation from RF to people, not a measurement; a gate-level enplanement feed (§15) would replace it. Even at proxy precision the point stands: on the weakest carrier, most passengers board at a gate where their 5G signal is below the healthy threshold — and the Boldyn cutover is the instrument that changes that sentence.

13. Prioritised Recommendations

Numbered, ordered by leverage, each with an owner.

#	Recommendation	Owner
1	Write §14's acceptance criteria into the Boldyn cutover plan now: asymmetry-spread compression at the named gates, T-Mobile NR validation in the Alaska hub (C+N), and the no-critical-gates floor. T-Mobile's hosted path is the largest single measurable lift (17% of gates healthy today).	Port of Seattle + Boldyn
2	Baseline the AT&T legacy DAS (as-builts, PCI plan, re-tuning history) before decommissioning — the incumbent profile is the parity bar for the new system, and its documentation disappears at cutover.	Port of Seattle + AT&T
3	Before cutover: locate, attest, and document whatever explains Verizon's indoor-stronger profile and Concourse-B dominance (§3.2, §5.2) — an unrecorded independent path decommissioned unexamined is the largest transition risk in the record.	Port of Seattle + Verizon
4	Re-measure with the identical instrument (same window length, same thresholds) 90 days post-cutover; Ookla's native date-range comparison renders the before/after directly (§14, §15).	Imagine Wireless
5	Treat Wi-Fi as a coexisting capacity layer in the new design (venue offload is material, §7.1); obtain controller telemetry to size it — no Wi-Fi node is even recorded in the graph today.	Port of Seattle IT
6	Decide the CBRS/private-wireless question alongside the DAS build (§8), not after it — retrofitting operational wireless after a neutral-host build re-opens the ceiling twice.	Port of Seattle

7	Pull the §15 next layers before the next issue — indoor building-polygon mask, User Density, date-range comparison — each upgrades a named claim from proxy to measurement.	Imagine Wireless

14. Acceptance Criteria and Re-Measurement Plan

The page the Port can paste into the Boldyn acceptance plan: threshold, zone, carrier, and re-test timing. Thresholds are the locked ladder (§16); validation points are the measured worst cases from §10.

Zone / point	Carrier	Criterion (threshold)	Re-test
All measured gates	Every hosted carrier	5G SS-RSRP median ≥ −95 dBm per gate	90 days post-cutover, then quarterly
All measured gates	Every hosted carrier	No gate below −110 dBm (today: 0 gate-carrier pairs below)	90 days post-cutover
Alaska hub (C+N)	T-Mobile	Healthy NR at ≥ 90% of hub gates (today: 5%)	90 days post-cutover
Alaska hub (C+N)	AT&T	Hold parity: healthy NR at ≥ 84% of hub gates (today's incumbent bar)	90 days post-cutover
South Satellite (S)	All three	Healthy NR at every S gate for at least two of three carriers	90 days post-cutover
Gate A·A1	worst today: T-Mobile US	Best-minus-worst carrier spread ≤ 10 dB (today 15 dB)	90 days post-cutover
Gate A·A10	worst today: T-Mobile US	Best-minus-worst carrier spread ≤ 10 dB (today 15 dB)	90 days post-cutover
Gate A·A2	worst today: T-Mobile US	Best-minus-worst carrier spread ≤ 10 dB (today 14 dB)	90 days post-cutover
Gate A·A9	worst today: T-Mobile US	Best-minus-worst carrier spread ≤ 10 dB (today 13 dB)	90 days post-cutover
Gate A·A3	worst today: T-Mobile US	Best-minus-worst carrier spread ≤ 10 dB (today 13 dB)	90 days post-cutover

Re-measurement uses the same instrument as this baseline (Ookla Cell Analytics, identical window length and thresholds) so before/after is like-for-like; the Site Finder layer re-pulls with it so feeder geometry changes are visible too.

15. Next Layers to Add

Layer	What it would resolve	Source
Indoor building-polygon mask	Replaces the tenant-category indoor/outdoor proxy behind the donor-isolation diagnostic	Ookla portal pull
User Density (bins/buildings)	The dataset's only capacity signal: unique devices per bin, deduplicated	Ookla portal pull
Date-range comparison	Native before/after for the Boldyn cutover; converts this snapshot into a trend	Ookla portal pull
Poor Multi-Network Coverage	Vendor-ranked building-vs-carrier problem split; corroborates §4.3	Ookla portal pull
3D Z-axis view	15 m vertical bands; the export is flat but the portal is not	Ookla portal pull
Per-gate enplanements	Replaces §12's uniform-distribution proxy with measured exposure	Port of Seattle / airline schedules
AT&T legacy DAS as-builts / PCI plan	Baseline the incumbent before decommissioning	AT&T + Port of Seattle
Boldyn commissioning data	Per-carrier hosted-path coverage at cutover	Boldyn Networks
Wi-Fi controller telemetry	Airtime, retries, client density — converts	Port of Seattle IT

	presence into capacity	
CBRS / private-network attestation	Document any private footprint not in the graph	Port of Seattle
Public-safety (NFPA 1221) coverage	ERRCS / BDA posture	AHJ, public-safety integrator
Walk-test: jet bridges, STS transit, BHS corridors	Zones crowdsource cannot reach	Scanner survey
Site registry cross-check	Ookla Site Finder positions vs carrier/FCC registrations — upgrades §9.3 from estimate to attested geometry	Carriers / FCC ASR

16. Method, Thresholds, Confidence, and Caveats

Measurement source: Ookla Cell Analytics per-carrier tile exports for SEA, twelve-month window 2025-08-01 through 2026-07-31, clipped to the KSEA aerodrome polygon plus a 200 m buffer (53,055 on-airport carrier-tile rows retained from 245,114 exported). Measurement freshness at issue is 24 days — within the platform's 90-day policy. Join: tiles to gate/tenant points within an 80 m radius; gates from a pinned OpenStreetMap snapshot (103 gates), tenants from the pinned 2026-06 Google Places capture (203 points only — no polygons, no Z-axis). Tile-to-concourse zone assignment: nearest gate/tenant cluster within 500 m (disclosed proxy). Central tendency: median for every headline figure; means only where labeled (service availability). Carrier mapping: ATT → AT&T US, T-Mobile → T-Mobile US, Verizon → Verizon Wireless. Carrier ordering throughout: strongest indoor first (AT&T · Verizon · T-Mobile — asserted against the data at build time).

Threshold ladder (locked, one ladder everywhere): 5G NR SS-RSRP and LTE RSRP — healthy ≥ −95 dBm, at-risk −95 to −110, critical < −110. 5G SS-SINR — healthy ≥ 10 dB, at-risk 0–10, critical < 0. RSRQ — healthy ≥ −10 dB. A venue-specified threshold would override and be named here; none was provided. Minimum-sample rule: no chart or comparative claim ships on fewer than 30 underlying tiles/points; smaller cells are reported as counts with n visible, never ranked (applied: §5.5 lounges, §5.4 brands, §11 federal, sub-floor outdoor buckets in §5.2).

Sample basis and inference limits: crowdsourced background scans from consumer Android handsets (≈3% of devices), aggregated per tile over 12 months. The Android panel's composition differs by carrier (device mix, modem generations, plan demographics), so cross-carrier comparisons inherit a device-population bias this export cannot correct; sub-1-dB cross-carrier margins should not be read as rankings (§3.0 margin note). Supported: medians, shares, distributions at venue, concourse, gate-cluster, and tenant-category level with n disclosed. Not supported: throughput/latency/jitter (not in this export), per-carrier Wi-Fi offload (not derivable at any aggregation), device counts (User Density not pulled), sub-tile positioning, floor separation. Site Finder centroids are Ookla-estimated TECHNOLOGY-LAYER macro positions derived from crowdsourced RF — estimates, not carrier registry data, and LTE/NR layers on one structure appear as two entries; distances are computed to a disclosed main-terminal reference point, not to individual buildings.

Confidence tagging: facts sourced from the knowledge graph rather than measurement are tagged "(KG record, cited-not-held)" inline — Tier C in the claims ledger. Measured claims are Tier A and reproduce from the raw exports via the verification bundle; transcribed values are Tier B with capture dates in the provenance manifest. The tenant point list is a Tier-B pinned capture (2026-06); its carrier stats are Tier-A recomputations on the current window.

Caveats: the dataset is gate-area and public-corridor weighted; it does not cover jet-bridge interiors, the underground satellite transit system, or BHS corridors. PCI diversity, serving-cell volatility, and band

distributions are aggregate proxies, not active traces or carrier NMS data. The Optimization Priority index is Ookla's vendor-defined layer, reported as such. Vendor, contract, and leadership facts in §2 reconcile against das_master_feb2026 and the Airport-KnowGraph registry and are cited-not-held.

Provenance discipline: every numerical value in this report is computed from the cited source files at build time or carries an inline cited-not-held tag. No value is estimated or invented. Engineering inferences about cause are labeled as inferences where they appear.

Appendix A — Lowest-Reading Mapped Points per Carrier (5G NR RSRP; n ≥ 30 only)

The 203 mapped points blend terminal-interior tenants with landside and periphery businesses (curbs, garages, airport-adjacent roadside, road-intersection POIs) — that mix is deliberate: it is the outdoor bucket of the §5.2 diagnostic. This table is therefore an inventory of the lowest-reading POINTS on or near airport property, not a terminal-tenant league table. Per the §16 minimum-sample rule, only points whose per-carrier aggregate rides on n ≥ 30 tiles are ranked here; below-floor points are omitted entirely. Category strings come from the pinned 2026-06 capture as-is.

AT&T

RSRP (dBm)	Conc	Category	Point	n (tiles)
-119.8	N	transport_admin	S 154th Ln & 24th Ave S	60
-118.6	N	transport_admin	S 154th Ln & 24th Ave S	63
-118.6	N	transport_admin	S 154th Ln & 24th Ave S	59
-106.9	N	transport_admin	Air Cargo Rd & S 161st St	97
-105.9	N	retail	FedEx Ship Center	44
-104.8	N	transport_admin	Air Cargo Rd & S 160th St	91
-101.8	N	transport_admin	Air Cargo Rd & S 165th St	114
-97.9	A	food	RBG Bar and Grill	102
-97.9	D	food	Spencer's for Steaks and Chops	100
-97.6	N	transport_admin	Air Cargo Rd & S 156th St	52
-97.1	N	transport_admin	Air Cargo Rd & S 156th St	61
-97.1	B	retail	Sound Auto Care	49
-96.2	B	other	Jim's Detail Shop	53
-95.9	N	lounge	Alaska Lounge - Concourse N	218
-95.7	N	transport_admin	Air Cargo Rd & S 156th St	37
-95.4	N	food	Caffe D'arte	220
-95.2	A	services	Gesa Credit Union	109
-95.2	A	transport_admin	Sea-Tac Airport	172
-95.1	N	food	Skillet Airport @ SeaTac International	215
-94.6	A	transport_admin	International Blvd & S 182nd St	119

Verizon Wireless

RSRP (dBm)	Conc	Category	Point	n (tiles)
-106.0	N	retail	FedEx Ship Center	42
-104.0	N	transport_admin	S 154th Ln & 24th Ave S	70
-103.3	N	transport_admin	S 154th Ln & 24th Ave	76

			S	
-103.2	N	transport_admin	S 154th Ln & 24th Ave S	78
-102.7	D	food	Spencer's for Steaks and Chops	103
-102.5	N	transport_admin	Air Cargo Rd & S 165th St	115
-102.5	N	transport_admin	Air Cargo Rd & S 166th St	121
-102.3	N	transport_admin	Air Cargo Rd & S 166th St	121
-101.9	N	transport_admin	Air Cargo Rd & S 166th St	122
-100.9	D	transport_admin	Park N Fly - Self Park	118
-100.6	D	transport_admin	Top Spot Airport Parking	35
-99.9	N	services	DHL Express Service Point Seatac	40
-99.8	D	food	Denny's Restaurant	126
-99.7	D	food	The Meltdown	124
-99.7	N	other	eVgo	175
-99.6	S	transport_admin	MVP Airport Parking	32
-99.2	D	lodging	SeaTac Inn	105
-98.9	D	services	ATM	113
-98.2	D	transport_admin	SeaTac/Airport Station	188
-98.1	N	transport_admin	Air Cargo Rd & S 156th St	73

T-Mobile US

RSRP (dBm)	Conc	Category	Point	n (tiles)
-104.9	B	transport_admin	Hertz	30
-102.0	S	retail	Les Boulangers Associes Inc	46
-102.0	A	admin	US Customs and Border Protection - Global Entry En	224
-101.9	A	food	Capitol Hill Food Hall - A Gates	202
-101.9	A	transport_admin	Sea-Tac Airport	223
-101.8	A	retail	InMotion	202
-101.7	B	lounge	British Airways Lounge - SEA	237
-101.7	B	other	Delta Flight Operations	229
-101.7	A	food	Manchu Wok	203
-101.6	A	services	SeaTac	236
-101.5	A	services	SeaTac	227
-101.4	B	lounge	Delta Air Lines Inc	234
-101.4	B	food	Starbucks	218
-101.4	A	retail	Tax and Duty Free	218
-101.3	B	food	Floret - By Cafe Flora	228
-101.3	B	services	SeaTac	233
-101.3	A	admin	United Baggage Claim	237
-101.2	A	retail	Caffé D'arte	222
-101.1	A	services	International Currency Exchange	221
-101.0	A	retail	Hudson	219

Appendix B — Strongest-Serving Band Tables per Carrier (with footprint share)

Same top-6 bands as §9.1, extended with each band's share of the carrier's reporting tile footprint.

AT&T — 5G NR strongest band

Band	Tile count (n)	Share of NR footprint
NR3700	378	66.1%
NR850	104	18.2%
NR3500	66	11.5%
NR1900	6	1.0%
NR2600	5	0.9%
NR2100	5	0.9%

AT&T — LTE strongest band

Band	Tile count (n)	Share of LTE footprint
LTE1900	6342	45.9%
LTE700	3269	23.6%
LTE2100	3230	23.4%
LTE2300	661	4.8%
LTE700PS	303	2.2%
LTE1800	21	0.2%

Verizon Wireless — 5G NR strongest band

Band	Tile count (n)	Share of NR footprint
NR3700	2325	40.1%
NR3500	1748	30.1%
NR1900	1158	20.0%
NR850	560	9.6%
NR2100	8	0.1%
NR2500	3	0.1%

Verizon Wireless — LTE strongest band

Band	Tile count (n)	Share of LTE footprint
LTE2100	12094	77.5%
LTE700	1792	11.5%
LTE800	1658	10.6%
LTE1900	62	0.4%
LTE1800	3	0.0%
LTE5500	2	0.0%

T-Mobile US — 5G NR strongest band

Band	Tile count (n)	Share of NR footprint
NR2500	7097	42.2%
NR2600	5606	33.4%
NR1900	2461	14.6%
NR600	1643	9.8%
NR2100	1	0.0%

T-Mobile US — LTE strongest band

Band	Tile count (n)	Share of LTE footprint
LTE1900	7707	51.9%
LTE2100	6394	43.1%
LTE700	527	3.5%
LTE600	201	1.4%
LTE1800	21	0.1%
LTE2600	1	0.0%

Appendix C — Full Airline Lounge Table

Conc	Lounge	ATT RSRP/SINR	VZ RSRP/SINR	TMO RSRP/SINR	Wi-Fi%	n
A	The Club SEA - Concourse A	-92/+11	-86/+16	-96/+9	72%	507
A	United Club	-85/+15	-87/+18	-100/+8	68%	544
B	American Express Centurion Lounge	-88/+15	-88/+17	-96/+15	77%	603
B	British Airways Lounge - SEA	-89/+12	-89/+16	-102/+8	87%	694
B	Delta Sky Club Concourse A	-91/+14	-87/+16	-100/+10	81%	656
B	USO SeaTac	-90/+13	-87/+16	-100/+11	88%	701
C	Alaska Airlines Lounge	-92/+14	-89/+15	-101/+10	81%	664
C	Alaska Lounge - Concourse C	-91/+12	-94/+12	-96/+10	74%	590
C	Alaska Lounge - Concourse D	-92/+14	-89/+15	-100/+10	84%	685
N	Alaska Lounge - Concourse N	-96/+13	-97/+11	-100/+9	85%	685
S	British Airways Lounge	-84/+16	-88/+14	-97/+10	83%	669
S	The Club SEA	-85/+15	-87/+14	-97/+10	85%	680