

Indoor 5G Architecture Guide

Choose the deployment model around the building, its traffic and the available cabling.



VEGA250

Integrated small cell

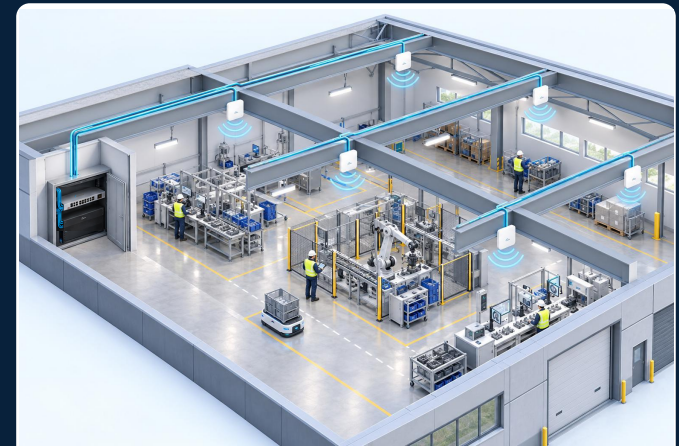
Compact sites and local capacity zones.



POLARIS10 + Passive DAS

Integrated gNB with passive antennas

Coverage continuity with few logical cells.



BBU + rHUB + pRRUs

Central processing, distributed radios

Complex buildings and planned capacity zones.

VEGA250 small cell

REPRESENTATIVE SETTING

Small shop or branch

One compact gNB places baseband, radio and antennas near the users.

Why it fits

A simple starting point for one or a few compact zones. Add units when more local coverage or capacity is needed.

What to plan

Backhaul, power or PoE, synchronization and interference between cells as the site grows.



One overhead VEGA250 serves the shop. Additional small cells can create independent capacity zones when planned together.



Representative placement. Equipment enlarged for visibility; cabling is schematic. Core/UPF is shown in the logical path only.

POLARIS10 + Passive DAS

REPRESENTATIVE SETTING

Long indoor corridor or service tunnel

One integrated gNB feeds passive coax, splitters and antennas along the route.

Why it fits

Well-placed antennas can extend one cell footprint and minimize handover boundaries along a linear space.

What to plan

Feeder and splitter loss, RF power balance, antenna compatibility and passive intermodulation. Extra antennas share the cell capacity.



POLARIS10 (left) feeds the ceiling antennas. Passive distribution extends the RF footprint while sharing the same cell capacity.



Representative placement. Equipment enlarged for visibility; cabling is schematic. Core/UPF is shown in the logical path only.

BBU + rHUB + pRRUs

REPRESENTATIVE SETTING

Large manufacturing plant

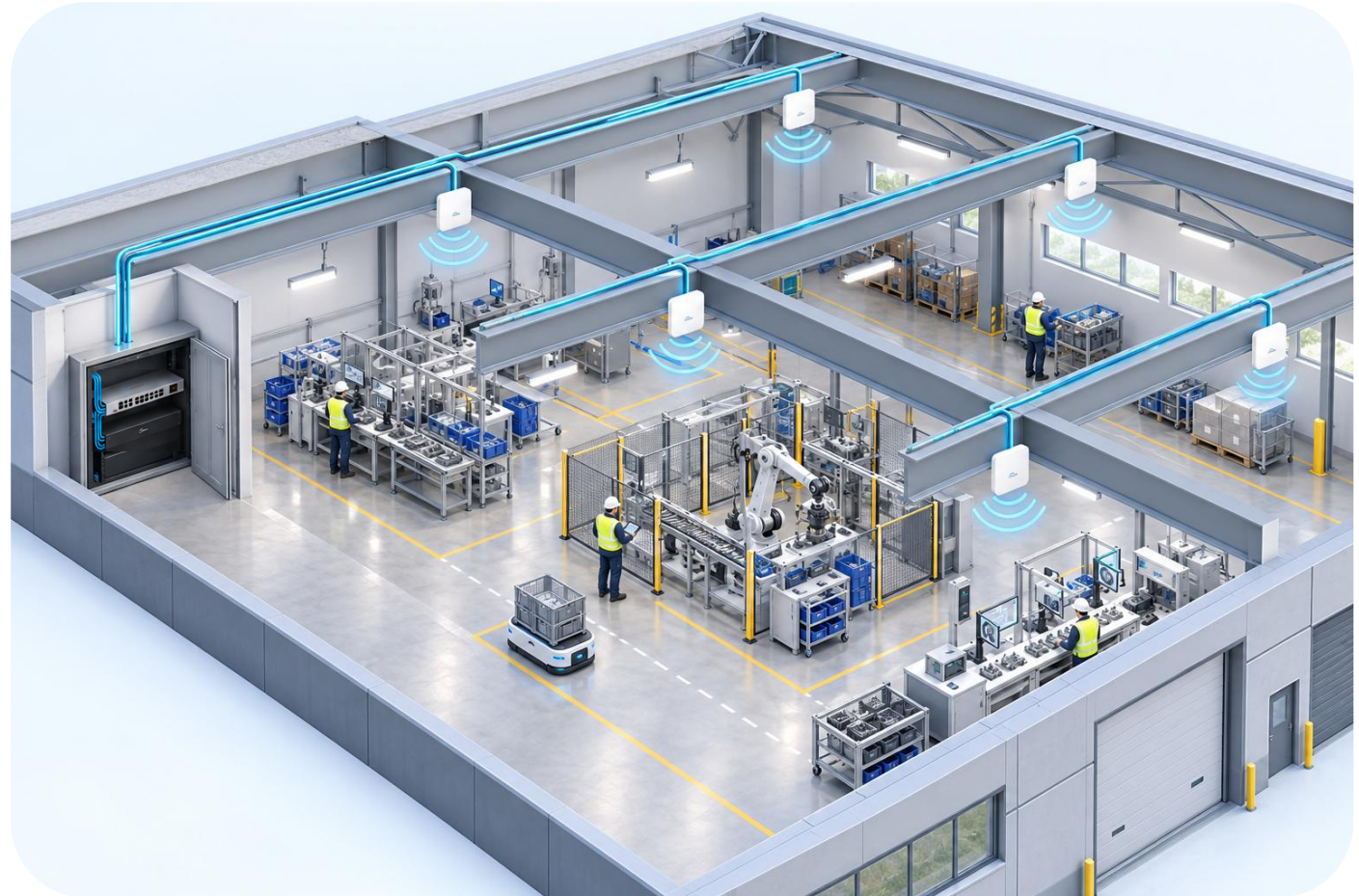
A central BBU serves radio points positioned across production and working areas.

Why it fits

Flexible pRRU placement brings radios close to users. Shared-cell or multi-cell mapping follows the coverage and traffic plan.

What to plan

BBU capacity, 10GE digital fronthaul, rHUB locations, hybrid cable or fiber, timing and resilience.



The cabinet contains the BBU and rHUB; overhead units are pRRUs. Radios mapped to one shared cell share its capacity.

5G Core / UPF

BBU

rHUB

Distributed pRRUs

Representative placement. Equipment enlarged for visibility; cabling is schematic. Core/UPF is shown in the logical path only.

Architecture, coverage and capacity

Reference conditions and interpretation are part of the comparison.

Dimension	VEGA250 Small cell	POLARIS10 + Passive DAS	BBU + rHUB + pRRUs	How to interpret it
Architecture	Integrated low-power small gNB; baseband and radio are in one node near the users.	Integrated 2 × 10 W gNB feeding an indoor antenna system. This comparison assumes a passive coax/splitter/antenna network.	Centralized BBU connected by digital fronthaul to rHUBs and low-power ceiling/wall pRRUs.	Integrated solutions minimize network elements. Distributed architecture separates processing from radio placement.
Best-fit deployment	Small offices, retail, branches, localized private-network zones, isolated coverage gaps and capacity hotspots.	Coverage-first open halls, warehouses, workshops, or sites with an existing/reusable passive antenna system.	Large complex buildings, multi-floor venues, hospitals, hotels, campuses and buildings requiring many radio points or staged expansion.	Choose primarily by building complexity, capacity zoning and available cabling - not only by floor area.
Coverage approach	One local cell per unit. Short RF path and radio close to the user; add units for additional zones.	One/few high-power cells distributed through splitters, feeders and antennas. Good reach, but link budget is reduced by feeder/splitter losses.	Many pRRUs placed close to users. A group of pRRUs can be mapped to a shared cell for continuous coverage.	No certified area-per-node figure is provided in the workbook. Confirm coverage through a link budget and floor-plan prediction.
Capacity scaling	Adding another small cell can add independent radio resources, subject to spectrum reuse, synchronization and interference control.	Adding passive antennas improves RF distribution but does not add scheduler resources or cell throughput; users share the same cell capacity.	Adding pRRUs to the same shared cell improves coverage/edge quality but does not create new cell capacity. Capacity increases when additional cells are configured, within BBU limits.	Cell count - not antenna or radio-point count - is the first-order capacity scaling unit.

Performance reference values

Reference conditions and interpretation are part of the comparison.

Dimension	VEGA250 Small cell	POLARIS10 + Passive DAS	BBU + rHUB + pRRUs	How to interpret it
Capacity references	Platform at 100 MHz: 1,200 UE access and 400 concurrent services; 8 UEs/TTI.	Platform capacity figure as POLARIS10 at 100 MHz: 1,200 UE access and 400 concurrent services; 8 UEs/TTI.	BBU maximum 4 × 2T2R cells or 2 × 4T4R cells; 200 active users per 5G cell.	The terms are not identical: 'UE access/concurrent services' and 'active users' must not be treated as directly equivalent.
Peak-rate references	2TX platform reference at 100 MHz: DL 850 Mbps / UL 230 Mbps under the stated TDD frame.	2TX platform reference at 100 MHz: DL 850 Mbps / UL 230 Mbps under the stated TDD frame.	4T4R, 100 MHz, 256QAM: 1 UE DL 1.5 Gbps / UL 200 Mbps in the performance table; 100 UEs DL 1.26 Gbps / UL 180 Mbps.	Peak rate is not venue capacity. Throughput depends on TDD pattern, spectrum, MCS, UE capability, load and interference.
Latency	Shortest architecture path: no separate digital fronthaul. Integrated-platform lab reference is around 10 ms ping after ICMP optimization; transmission delay still applies.	Same integrated architecture. A passive antenna network adds negligible processing delay, although poor RF quality can increase HARQ/ARQ retransmissions and user-perceived latency.	Digital fronthaul adds a controlled transport stage. Documents expose 30/60/90/100 μs delay-compensation settings, but no directly comparable end-to-end latency result.	Do not claim an architecture SLA from these values. Compare all three with the same UE, core/UPF, backhaul, TDD pattern, load and RF conditions.

Planning, deployment and operations

Reference conditions and interpretation are part of the comparison.

Dimension	VEGA250 Small cell	POLARIS10 + Passive DAS	BBU + rHUB + pRRUs	How to interpret it
Cell planning	Simple for one or two cells; complexity rises quickly with node count: PCI, neighbors, handovers, TDD synchronization, reuse and interference.	Usually fewer logical cells and fewer handovers. RF design is the harder part: feeder loss, splitter ratios, antenna placement, PIM and power balancing.	Highest upfront design effort: BBU/rHUB/pRRU topology, fronthaul, shared-cell mapping, delay compensation, cell split and interference planning. Centralized control helps operations later.	POLARIS10 simplifies logical cell planning but increases passive RF design work; BBU platform centralizes logic but adds topology design.
Mobility inside venue	Movement across different small cells may trigger handovers; good neighbor design is required.	Users remain on the same cell across its antenna footprint, so intra-system handovers are normally minimized.	pRRUs in one shared cell can provide continuous coverage without inter-cell handover; cell splits reintroduce handover boundaries.	Shared-cell design trades mobility simplicity for shared capacity.
Deployment effort	Lowest initial effort per site; Ethernet/fiber backhaul, power/PoE option and synchronization must still be engineered.	Moderate. Few active nodes, but coax, splitters, connectors and antenna commissioning can be labor-intensive.	Highest. Requires BBU rack/power, 10GE fronthaul, rHUB placement, hybrid cable/fiber, pRRU installation and end-to-end commissioning.	Complexity is shifted: active-node count for small cells, RF plumbing for POLARIS10, transport/topology for BBU platform.
Operations and fault domain	Distributed failure domain: one unit failure normally affects one local cell. More cells mean more managed nodes.	One gNB is easy to manage, but a gNB or common RF-path failure can affect the entire antenna footprint; passive faults can be time-consuming to isolate.	Centralized O&M and fewer baseband nodes. BBU or upstream rHUB failures can affect multiple radio points, so resilience and spares matter more.	Operational simplicity and failure-domain size move in opposite directions.

Strengths, trade-offs and selection

Reference conditions and interpretation are part of the comparison.

Dimension	VEGA250 Small cell	POLARISTO + Passive DAS	BBU + rHUB + pRRUs	How to interpret it
Main advantages	Fast deployment; low entry cost/complexity; local capacity; failure isolation; easy incremental expansion by zone.	Strong coverage reach; few logical cells; no packet-processing delay in passive distribution; good fit for open coverage-first spaces.	Coverage uniformity in complex buildings; flexible radio placement; shared-cell mobility; multi-cell capacity options; centralized O&M.	Each architecture is optimized for a different scaling problem.
Main disadvantages	Many cells can create interference, handover and backhaul/O&M complexity; coverage gaps may require additional nodes.	Passive losses and RF balancing; adding antennas does not add capacity; high-power cell can create interference if over-driven; limited flexibility after coax is installed.	Highest CAPEX/design/commissioning complexity; strict fronthaul/timing requirements; shared-cell capacity is pooled across pRRUs.	Avoid 'one solution wins everywhere' positioning.
Recommended starting point	Default for small, simple and localized indoor deployments.	Default for a large open or coverage-driven venue when passive RF distribution is practical.	Default for a large complex/multi-floor building or when uniform coverage, centralized O&M and future capacity zoning are priorities.	Run a link budget and traffic model before final selection.

Scenario fit: sites and traffic

Engineering guidance, not guarantees. High = strong starting point. Validate floor plans, RF, traffic and transport.

Scenario and site characteristics	VEGA250	POLARIS10 + Passive DAS	BBU + rHUB + pRRUs	Recommended starting point
Small office / shop / branch One or a few compact zones; modest UE count; fast deployment is important.	HIGH Single integrated node is usually sufficient; simple expansion by adding another cell.	LOW 2 × 10 W plus passive RF is usually unnecessary unless reusing existing infrastructure.	LOW BBU/rHUB/pRRU architecture is normally over-engineered for a very small site.	VEGA250.
Small factory or segmented indoor zone Several rooms or production areas; localized coverage/capacity needs.	HIGH Independent cells can target each zone and isolate faults.	MEDIUM Works if a clean feeder/antenna layout is available and capacity is modest.	MEDIUM Good if the site will expand or requires centralized radio placement.	VEGA250 first; BBU + rHUB + pRRUs if expansion/centralization matters
Large open warehouse / hall High ceiling, open propagation, relatively uniform traffic.	MEDIUM Multiple cells work but require overlap/interference planning.	HIGH High-power gNB feeding well-placed antennas is efficient for coverage-first design.	HIGH Distributed pRRUs provide uniform coverage and flexible placement; best when capacity zoning is also needed.	POLARIS10 for coverage-first; BBU + rHUB + pRRUs for coverage + capacity zoning
Large open high-density venue Crowds or heavy traffic concentrated in sectors; capacity matters more than simple coverage.	HIGH Multiple small cells can create independent capacity zones if carefully synchronized/planned.	MEDIUM A single antenna-fed cell shares one capacity pool; additional cells/sectors are needed for capacity.	HIGH Use multiple cells within BBU limits and map pRRUs to traffic zones; avoid one oversized shared cell.	BBU + rHUB + pRRUs or multi-cell VEGA250; not antenna count alone
Large complex multi-floor building Many rooms, floors, shafts and RF barriers; coverage uniformity and operations matter.	MEDIUM Possible, but node count, handovers and O&M grow quickly.	MEDIUM Coax losses, routing and balancing become difficult; fewer logical cells are an advantage.	HIGH Remote pRRUs close to users and shared-cell/multi-cell mapping suit complex geometry.	BBU + rHUB + pRRUs

Scenario fit: continuity and growth

Engineering guidance, not guarantees. High = strong starting point. Validate floor plans, RF, traffic and transport.

Scenario and site characteristics	VEGA250	POLARIS10 + Passive DAS	BBU + rHUB + pRRUs	Recommended starting point
Hospital / hotel Many rooms and corridors; difficult RF penetration; maintenance disruption must be minimized.	MEDIUM Simple per-zone deployment but potentially many nodes and handover boundaries.	MEDIUM Can cover corridors/floors, but cable routing and loss must be carefully engineered.	HIGH Dense low-power pRRUs, centralized equipment and shared-cell options provide controlled coverage.	BBU + rHUB + pRRUs
Long corridor / tunnel-like indoor path Linear geometry; coverage continuity more important than peak capacity.	MEDIUM Multiple cells may create repeated handovers.	HIGH Antenna distribution can maintain one-cell continuity if RF loss is manageable.	HIGH Distributed pRRUs in a shared cell provide continuous coverage and flexible placement.	POLARIS10 or BBU + rHUB + pRRUs; decide by cabling and capacity
Existing passive DAS refresh Coax, splitters and antennas already installed and verified for n41.	LOW Does not naturally reuse the passive DAS topology.	HIGH Natural fit if RF components support the band/power and PIM/link-budget requirements.	MEDIUM May require new hybrid/fiber cabling and ceiling radio installation.	POLARIS10 after full DAS audit
Phased campus / building expansion Coverage will be added by zone over time; future traffic is uncertain.	HIGH Add cells incrementally with localized investment.	MEDIUM Passive system changes may be disruptive after installation.	HIGH Add pRRUs/rHUBs and split cells as the traffic model evolves, within platform limits.	VEGA250 for small phases; BBU + rHUB + pRRUs for planned large-scale growth
Smallest failure impact A single hardware failure should affect the smallest possible area.	HIGH Each integrated cell is a relatively small failure domain.	MEDIUM Common gNB or passive trunk faults affect the served footprint.	MEDIUM pRRU failure is local, but BBU/rHUB failures can affect many radios.	POLARIS

Start the conversation with the site

Use these points to frame architecture selection and the information needed for the next step.

Topic	Recommended wording	Why it is accurate
Core selection message	There is no universal indoor architecture winner: VEGA250 optimizes simplicity and localized capacity, POLARIS10 plus a passive antenna system optimizes coverage reach with few cells, and the BBU architecture optimizes distributed radio placement and centralized control for complex buildings.	Matches the physical architectures and keeps scenario selection central.
Capacity	Capacity scales primarily with cells, spectrum, MIMO layers and scheduler resources - not simply with the number of antennas or pRRUs.	A passive antenna does not create new baseband resources; same-cell pRRUs share the cell resource pool.
Latency	Integrated designs have the simplest radio-to-baseband path, while distributed designs add controlled digital fronthaul. In practice, end-to-end latency is usually driven more by TDD pattern, RF quality, retransmissions, transport and UPF placement, so a same-condition test is required.	Reflects the documented integrated lab reference and the absence of a comparable BBU platform E2E figure.
Coverage	POLARIS10 can efficiently feed a passive antenna system for open or coverage-driven venues; the BBU architecture places low-power pRRUs closer to users in complex spaces; VEGA250 adds compact cells where needed.	Describes the RF topology without inventing square-meter coverage figures.
Mobility	A passive antenna system or a shared cell across BBU-connected pRRUs can reduce indoor handover boundaries. Multiple VEGA250 cells or multiple cells on the BBU platform allow capacity zoning but require mobility and interference planning.	Captures the shared-cell versus multi-cell tradeoff.
Planning	POLARIS10 generally has simpler logical cell planning but more passive RF engineering; VEGA250 shifts complexity to multi-cell coordination as node count grows; the BBU architecture requires the most topology planning upfront but centralizes ongoing control.	Separates cell planning from physical/RF planning.
Next step	Start with the venue geometry, expected simultaneous users by zone, traffic mix, latency target, available spectrum, backhaul/UPF location and existing cabling. Then choose the architecture and cell split.	These inputs determine both coverage and capacity.

Get in Touch

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