# Node-H

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## Deployment specialist brings 5G to market

### Carrier-grade RAN solutions for rapid deployment

Node-H has a proven track record of wide-scale deployments at senior operators, and works closely with end-to-end eco-system vendors so operators can source complete or disaggregated solutions for their RAN.

Node-H carrier-grade software powers this standalone, fully-integrated, low-cost Askey 5G Outdoor Small Cell, which operates in the widely-used n78 frequency band.

Node-H brings deep technical know-how to solving real-world issues which has allowed carriers worldwide to deploy millions of cells based on Node-H software.

By working closely with technology partners, Node-H supports end-to-end and disaggregated solutions with different 5G cores and management systems.

The Node-H Askey 5G Outdoor Small cell brings turnkey disaggregated cells to public mobile operator uses cases. It also provides the foundation to rapidly address Private 5G networks in vertical markets such as nomadic networks, real-estate, Industry 4.0 or Campus networks.

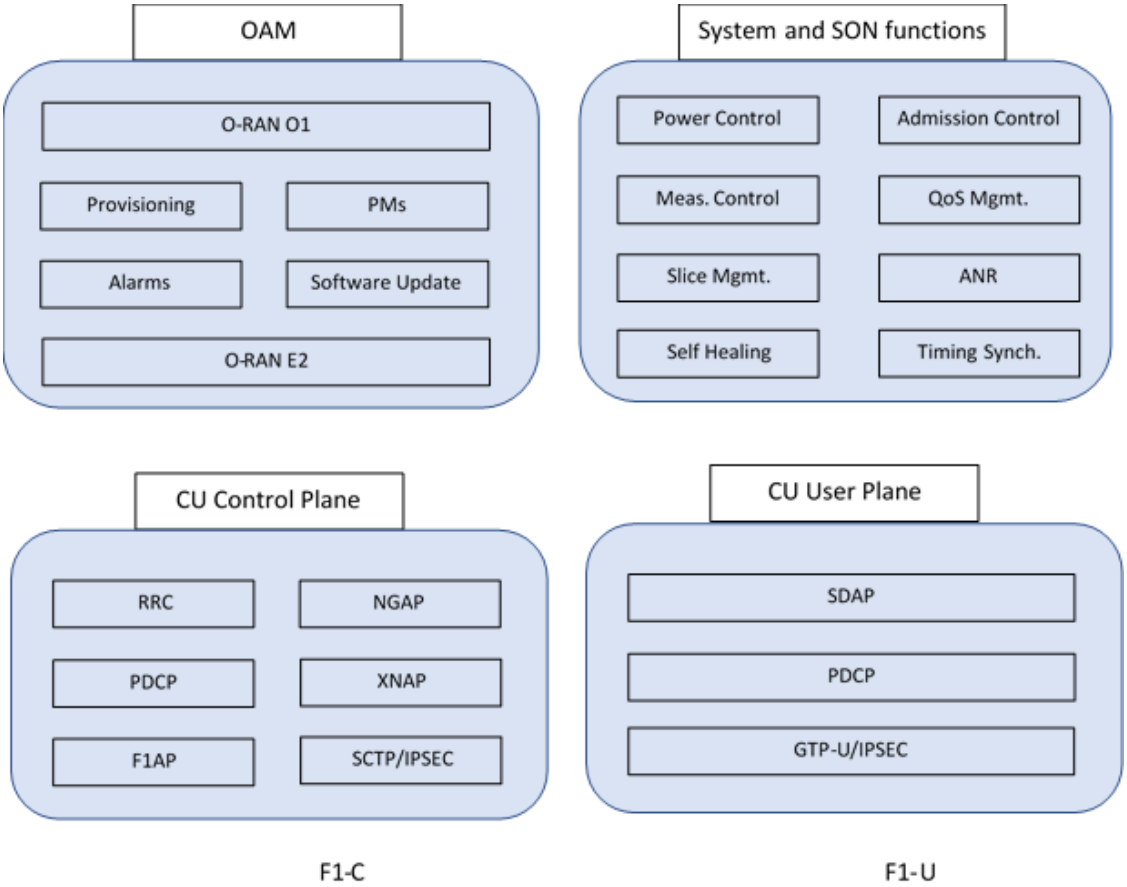
The Node-H 5G SA software follows the standards-based 3GPP architecture, as well as O-RAN and Small Cells Forum defined interfaces. Node-H has focused much effort on interoperability, having integrated Node-H based cells with infrastructure from all of the major network equipment vendors, and received the Chairman's Award from the Small Cell Forum for work on Interoperability.

**Choose Node-H because…**

Node-H has a uniquely experienced team of specialists who cover all of the major technologies required to implement complete RAN solutions.

Node-H integrates its system software, including a comprehensive security solution, management software, scheduler and L2/L3 protocols, with Askey's hardware design to deliver a ready-to-deploy solution with the lowest TCO.

# gNB 5G Application




# Features

| | |
|---|---|
| **SA Architecture** | The Node-H T&W 5G Standalone Small Cell supports the Option 2 – NR Standalone architecture |
| **Carrier Bandwidth** | Up to 100MHz.in steps of 10MHz |
| **Capacity** | Up to 64 Active UEs, with data rates up to 800Mbps DL and up to 400Mbps UL, depending on the slot configuration. |
| **Power Management** | Configurable up to 27dBm in steps of 0.1dBm. |
| **Voice Calls and Quality of Service** | 5G VoNR in accordance with 5QI. Comprehensive 5QI support in UL and DL and association with vLAN configuration for end-to-end QoS. |
| **SON features** | ANR for establishing neighbor lists, Admission control |
| **Mobility** | Measurements allow the cell to support 5G inter and intra Cell handovers; core based NG and cell-based Xn handovers are supported. |
| **Network slicing** | Multiple slices with network resource isolation. |
| **Operations and Maintenance** | Management of the cell is via the O-RAN O1 service models using Netconf/YANG in accordance with the relevant O-RAN specifications. E2 is also supported for advanced applications. Built-in O-RAN WebUI including Live-Stats |
| **Security** | The security of the platform is assured using the relevant O-RAN specs through the O1 interface. Ciphering with hardware acceleration, Signaling integrity checking. IPSEC, IKE v2 key management, AES, Certificate-based security. |
| **Timing Solution** | The timing solution supports GNSS and PTP time synchronization. |
| **3GPP Release** | The 3GPP message support corresponds to the 3GPP Release 17 specifications. |

# Protocol compliance

### 3GPP Standards (rel17)

TS 38.300 5G; NR; Overall Description; Stage-2
TS 38.321 5G; NR; Medium Access Control (MAC)
TS 38.322 5G; NR; Radio Link Control (RLC)
TS 38.323 5G; NR; Packet Data Convergence Protocol (PDCP)
TS 38.331 5G; NR; Radio Resource Control (RRC)
TS 38.401 5G; NG-RAN; Architecture Description
TS 38.413 5G; NG RAN; NG Application Protocol (NGAP)
TS 38.423 5G; NG RAN; Xn Application Protocol (XnAP)
TS 38.425 5G; NG RAN; NR User Plane Protocol
TS 38.473 5G; NG RAN; F1 Application Protocol (F1AP)
TS 38.474 5G; NG RAN; F1 Data Transport
TS 37.324 5G; NR; Service Data Adaptation Protocol (SDAP)
TS 28.552 5G; NR 5G Mgmt. and Orchestration: Perf. Meas.

### Small Cell Forum, O-RAN, IETF

SCF 222 5G FAPI
SCF 223 P19 RF Control
SCF 224 Network Monitor Mode
O-RAN-WG1-O-RAN Architecture Description
O-RAN A1 interface: Application Protocol Version
O-RAN Near-RT RIC Architecture
O-RAN Near-RT RIC E2 Application Protocol
IPv4/V6 – IETF RFC 791/2460
UDP – IETF RFC 768
SCTP – IETF RFC 4960

# Hardware

| Category | Sub Category | Item | Specification |
|---|---|---|---|
| **5G (FR1) system specification** | | | |
| Chipset Solution (NPU+QCM) | NPU | Network processor | NXP LS1046A |
| | Processor | Baseband Processor | FSM10056 |
| | RF | RFIC | SDR9000 |
| | | PA | SKY66318-11 |
| | | Duplexers/Filter | LFB213G60SG8B831, Murata |
| | Others | DDR | 4 GByte DDR4 , None-ECC |
| | | Flash | 4 GByte eMMC, QSPI flash 64MB |
| | | PMIC | PM8005 PMX50 |
| | | Clock | PMK8002, CTS VCTCXO |
| Synchronization | Synchronization scheme | Sync Sources | GPS<br>IEEE 1588 |
| 5G Sub-6G RF | Frequency Bands | Frequency Range | n78, n41, n79 |
| | | Standard | 3GPP 5G-NR Rel-15 |
| | | Duplex | TDD |
| | | Band width (MHz) | 100MHz |
| | Antenna | MIMO Configuration | 2 x 2 |
| | | Antenna Location (Internal / External Connectorized) | Internal |
| | TX specification | Output power | 24dBm (per antenna port) |
| | Radio conformance | Radio conformance spec. | 3GPP TS 38.104, 3GPP TS 38.141-1 |
| **Miscellaneous** | | | |
| | Power<br>POE | Power supply Type, Consumption | DC, less than 35W |
| | | External Power Supply | AC/DC power adaptor |
| | | POE | PoE++ |
| | Ethernet | | RJ-45 x 2<br>- 1 Gbps NBase-T Ethernet : for backhaul<br>- 1Gbps Ethernet : LMT<br>SFP x 1 (1 Gbps, for optical backhaul) |
| | Weight | | < 2.5 Kg |