

# ARG Cell Modem

LTE-M / NB-IoT Connectivity Module · nRF9160 · ARG IP

Rev A · March 2026  
Status: In Production  
Used in: iAQ-Pro, G360, C50

## OVERVIEW

The ARG Cell Modem is a fully integrated LTE-M / NB-IoT connectivity module built around the Nordic Semiconductor nRF9160 SiP. It handles cellular connectivity, MQTT brokering, offline message queuing, and OTA firmware delivery — completely autonomously, with zero connectivity logic required in the host application.

The module communicates with the host via the ARG Common Host API: a binary serial protocol over UART at 460800 baud with hardware flow control and CRC16 framing. The host sends application payloads; the modem handles everything below — radio, TLS, MQTT, retry, and buffering.

## ELECTRICAL & RADIO SPECIFICATIONS

Parameter	Value
Radio SiP	Nordic Semiconductor nRF9160-SICA
Radio standards	LTE-M (Cat-M1), NB-IoT (Cat-NB1) — 3GPP Release 13/14
Frequency bands	Bands 1/2/3/4/5/8/12/13/17/18/19/20/25/26/28/66 (global)
SIM support	Nano-SIM + embedded eSIM — Hologram Global SIM (default)
GNSS	Integrated A-GPS / GNSS (optional, via feature flag in CONFIG_SET)
Host interface	UART — 460800 baud, 8N1, RTS/CTS hardware flow control
Protocol	ARG Common Host API v2 (binary framed, CRC16-CCITT)
Supply voltage	3.0 – 3.6 V (nRF9160 VDD)
Current (idle)	~2.5 mA (LTE-M PSM active)
Current (TX peak)	~490 mA (23 dBm burst; host must supply peak current)
Current (sleep)	~2.5 uA (deep sleep, wake on HOST_RDY assertion)
Operating temp	-40°C to +85°C
Connector	10-pin 1.27 mm pitch (TX, RX, RTS, CTS, nRST, PWR_EN, GND x2, VDD x2)

## INTERNAL STORAGE (SPI NOR FLASH — W25Q32, 4 MB)

Parameter	Value
OTA staging	3.5 MB — receives new host or modem firmware images
Offline queue	256 KB — circular buffer, ~500 max-payload messages (494 B each)
NV parameters	64 KB — Zephyr NVS: device_id, product_ns, MQTT endpoint, offline threshold
Reserved	192 KB — future use

## HOST API — MESSAGE SUMMARY

Type	Name	Dir	Description
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0x01	CONFIG_SET	H→M	Send product namespace, device ID, feature flags. Modem persists to NVS; starts/restarts MQTT connection.
0x02	PUBLISH	H→M	Publish JSON or binary payload to MQTT topic suffix. Queued to NVS offline buffer if modem is not connected.
0x10	STATUS_GET	H→M	Request modem connection state, RSSI, offline time, firmware version, and GNSS state.
0x11	TIME_GET	H→M	Request current Unix epoch from network time service.
0x12	POWER_SET	H→M	Set modem power mode: OPERATING / OFFLINE / PSM / SLEEP.
0x13	LOCATION_PUSH	H→M	Trigger GNSS fix acquisition and MQTT publish (requires LOCATION_EN flag in CONFIG_SET).
0x20	OTA_HTTP_POST	H→M	HTTPS POST via modem acting as proxy (OTA check-in request).
0x21	OTA_HTTP_GET_CHUNKED	H→M	Start chunked HTTPS GET download of firmware image from pre-signed S3 URL.
0x81	STATUS_RESP	M→H	Modem connection state: UNCONFIGURED / CONNECTING / CONNECTED / OFFLINE / FAULT. Includes RSSI, offline_s, FW version, GNSS state.
0x82	RECEIVED	M→H	Incoming MQTT message on cmd topic — payload forwarded to host.
0x83	FAULT	M→H	Persistent fault: OFFLINE_THRESHOLD, SIM_MISSING, MODEM_FAULT, QUEUE_OVERFLOW.
0x84	TIME_RESP	M→H	Unix epoch + validity flag.
0x85	LOCATION_RESP	M→H	GNSS fix result: lat/lon (x1e7), accuracy (cm), epoch, state.
0x22	OTA_HTTP_CHUNK	M→H	Binary chunk of in-progress firmware download (offset + total + data).
0x23	OTA_HTTP_DONE	M→H	Firmware download complete.
0x24	OTA_HTTP_ERROR	M→H	HTTP/network error during OTA download.

## FRAME FORMAT

Every message is wrapped in the ARG binary frame format:

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[ SOF: 0xAA | VER: 0x02 | TYPE: 1B | LEN: 2B LE | PAYLOAD: 0-512B | CRC16: 2B LE ]
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Parameter	Value
SOF	0xAA — start-of-frame sync byte
VER	0x02 — protocol version (current)
TYPE	1 byte — message type (ARG_MSG_* constant)
LEN	2 bytes little-endian — payload length (0–512)
PAYLOAD	0–512 bytes — message-specific payload
CRC16	2 bytes LE — CRC16-CCITT (poly=0x1021, init=0xFFFF) over VER+TYPE+LEN+PAYLOAD
Max frame	519 bytes

## USED IN

Parameter	Value
iAQ-Pro Field	Handheld IAQ instrument — primary cloud uplink
G360	Industrial disinfection controller — cellular fallback to WiFi primary
C50 / iPM3	Power analyzer — cloud telemetry and OTA updates

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## ORDERING & INTEGRATION

The ARG Cell Modem is an ARG-owned IP module supplied to ODM customers and used in all ARG instruments. SIM provisioning is via Hologram Global SIM for worldwide coverage. Contact ARG for integration support, volume pricing, and the ARG Common Host API implementation library.