OnGo Alliance
Device Requirements
for OnGo Private Networks

ONGO-Devices

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1 Introduction and Scope

The purpose of this document is to specify the requirements for user equipment (UEs) to connect to OnGo Alliance 5G NR SA Private Networks.

2 References

[1] OnGo Alliance, ONGO-TS-9001, "OnGo Release 1 Certification Test Plan"

[2] "Apple device support for private 5G and LTE networks" https://support.apple.com/en-ca/guide/deployment/depac6747317/web

[3] OnGo Alliance Plugfest Test Results

3 Definition and Abbreviations

3.1 Definitions

None

3.2 Abbreviations

Abbreviation	Explanation
3GPP	3rd Generation Partnership Project
CA	Carrier Aggregation
CC	Component Carriers
CPE	Customer Premises Equipment
CBRS	Citizens Broadband Radio Service
CBSD	Citizens Broadband Radio Service Device
eSIM	Embedded SIM
GAA	General Authorized Access
MDM	Mobile Device Management
MIMO	Multiple Input Multiple Output
MOCN	Multiple Operator Core Network
MORAN	Multiple Operator Radio Network
NR	New Radio
OnGoA	OnGo Alliance
PAL	Priority Access License
PLMN	Public Land Mobile Network
RAN	Radio Access Network
SA	Standalone
SAS	Spectrum Access System
SHNI	Shared Home Network Identifier
SIM	Subscriber Identity Module
SM-DP+	Subscription Manager Data Preparation Plus.
SSF	Special Subframe
TBD	To Be Defined
TCA	Trusted Connectivity Alliance

Abbreviation	Explanation
TDD	Time Division Duplex
UE	User Equipment

4 OnGo 5G NR SA Private Network Background

This document describes requirements for user equipment (UE) to enable their operation with OnGo Alliance private networks utilizing 5G NR Stand Alone operation in the CBRS band.

OnGo private networks include a wide range of applications:

- Enterprise
- Fixed Wireless Access
- Internet of Things

In all cases, 5G NR SA is used and the network advertises the OnGo Shared Home Network Identifier (sHNI).

Currently there are over 400,000 OnGo basestations deployed by over 1000 network owners.

In order to enable broad deployment of 5G NR SA operation in the CBRS band, a level of consistent out-of-the-box operation is necessary.

While such behaviour is regularly exhibited for carrier networks, it is often not the case for private networks utilizing the OnGo sHNI.

Types of UEs include:

- Smartphones
- Modules (as part of a platform)
- USB dongles
- CPE routers
- CPE-CBSDs

Indeed, most problems encountered to date have been with tier-1 smartphones.

To that end, consistent OnGo operation for UEs is defined in this document.

The capabilities specified below shall be supported “out-of-the-box” and not in any way disabled by operators or other entities involved in the distribution of those devices.

Initially it is expected that UE vendors will self-declare to these requirements. The OnGo Alliance may in future undertake certification of these capabilities.

OnGo Alliance solicits feedback from vendors on the requirements defined in this document. The Alliance is willing to modify requirements based on market feedback.

5 Radio Layer

- UEs shall be 3GPP n48 compliant, including:
    - 10, 20, 30 and 40 MHz channel bandwidths
    - 2CC intra band 48 CA support
    - across entire band (150 MHz) contiguous CCs
    - across entire band (150 MHz) non-contiguous CCs [optional]
    - up to 2x2 MIMO support
- UEs shall be FCC Part 96 compliant, supporting:
    - GAA and PAL operation
- UEs shall support TDD config 0, 1 or 2 NR equivalent
    - with SSF 7
    - per OnGo TS-9001 V1.3 [1]

6 Network Layers

6.1 NR SA network operation

- The UE shall operate in 5G NR SA mode for OnGo private networks.
- 5G NR SA operation shall be automatically enabled in UEs.

6.2 Device configuration

- The UE shall use either physical SIM or eSIM stored credentials.
- The credentials must be pre-provisioned on the device.
- eSIMs shall be downloaded and installed from OnGo private network infrastructure vendor's eSIM server (SM-DP+) using any of the following methods:
    - Manual entry
    - QR code
    - Mobile device management (MDM)
    - Universal eSIM link
- All UE settings required for an OnGo private network shall be configured either:
    - Manually via a configuration profile
    - Remotely via a Mobile Device Management (MDM) solution
- No user intervention shall be needed to enable operation with OnGo private networks after the device has been configured
- in UEs that support multiple profiles it is acceptable that the user selects the profile appropriate for the private network

6.3 Network selection

- The UE shall automatically attach to a network advertising the OnGo 315-010 Shared Home Network Identified (sHNI).
- Assignment Mode Option 2 shall be supported for the sHNI (where the NID is unique to the PLMN-ID).
- Each network is uniquely identified on the SIM
- The NetworkIdentifier key is formatted in accordance with the Coordinated Network Identifier (NID) value for Option 1 or Option 2 as defined in 3GPP 23.501 § 5.30.2. The NID value consists of 10 hexadecimal digits that represent a 40-bit value following the 3GPP specification. For example:
    - <key>NetworkIdentifier</key>
    - <string>AB9876543C</string>
- The UE shall support a Registration Accept (REG-Accept) for Data (without voice activation).

- With Dual SIM UEs, users can make and receive calls and text messages using a carrier's network, while remaining connected to the OnGo private network.
- UEs shall have the option to prefer using cellular over Wi-Fi when both are available. With this setting, UEs can be set to prefer the OnGo private network, while still allowing Wi-Fi for services.

6.4 Network naming

- The UE shall support multiple methods for displaying the network name. These include:
    - Network Identity and Time Zone (NITZ)
    - Operator PLMN list (OPL)
    - PLMN network name (PNN)
    - Service provider name (SPN)

6.5 Voice

- In OnGo private networks, voice is typically supported using over-the-top private services, i.e. not via IMS.
- For UEs with multiple SIMs, one SIM can make and receive calls and texts on a carrier's network, while the other SIM can connect to the OnGo private network.
- If Wi-Fi Calling is supported on the UE and by the carrier's network, calls and messages using the carrier's subscription can be made over the OnGo private network when neither Wi-Fi or the carrier's network are available.

6.6 Security

- To safeguard user data from unauthorized access, the UE shall not use null-ciphering.
- To prevent unauthorized tampering or modifications during transmission and to prevent unauthorized access and interception, the UE shall use Non-Access Stratum / Radio Resource Control signaling confidentiality and integrity.
- The Subscription Concealed Identifier (SUCI) may use a non-null protection scheme. This can be achieved through either an on-SIM SUCI calculation or an ME SUCI calculation, as outlined in TCA 2.3.1 and 3.1 specifications. For detailed information, refer to the 3GPP Technical Specification 33.501.

6.7 Geofencing [optional]

- Multiple OnGo private networks may exist. By defining a geofence for each network, the appropriate SIM can automatically be turned on or off as the user moves in and out of OnGo coverage.
- Network identifiers are read-only from the SIM and Private Cellular Network payload and used solely for on-device matching. The Network Identifier (NID) must be unique across all configuration payloads and SIMs installed on the same UE.

- An OnGo private network eSIM or physical SIM can automatically be turned on when entering cellular network coverage defined by a geofence, using a Geofences dictionary with GeofenceId, Latitude, Longitude and RADIUS keys.
- By creating one or more geofences, the UE can switch between any combination of OnGo private network SIMs and carrier SIMs as the user moves in and out of OnGo private network coverage. When the UE enters the geofence, the private network SIM is enabled, and it is automatically disabled when the UE exits the geofence and leave OnGo private network coverage.
- Both the OnGo private network SIM and carrier SIM should be installed before assigning an OnGo private Network with a geofence.
- The OnGo private network payload allows defining up to 1000 geofences, each with a radius ranging from 100 meters to 6.5 kilometers. Radii should be set slightly greater than the private cellular network coverage area.
- When using Dual SIM on UEs with a carrier SIM and one or more OnGo private network SIMs, UEs should support the ability to always have “Allow Cellular Data Switching” turned on. This helps ensure the UE doesn’t lose access to cellular data when exiting the geofence.
- In cases where geofences of multiple OnGo private networks overlap, the UE shall operateson a *first come, first served* basis. The SIM for the first network whose geofence is activated will be turned on. When networks overlap, deactivating one SIM will automatically activate the SIM for the other network.
- OnGo private networks shall always use unique identifiers for each network. Using multiple SIMs with the same NetworkIdentifier or CsgNetworkIdentifier value will prevent activation of the private network payload
- UEs shall support configuration for up to 5 OnGo private networks. Geofences must be used to automatically switch the appropriate SIM on or off as the user moves in and out of OnGo private network coverage

Appendix: Change History

Version	Date	Description
V1.0.0	2024-11-03	Initial version
V1.0.1	2024-11-21	Cleanups, added reference, circulated to BDEWG
V1.0.2	2024-12-10	Feedback from Ed Pichon, added §6.9, few other edits, to be reviewed in BDEWG meeting

6.8 Roaming [optional - for future release of document?]

Private > public roaming

- Roaming shall comply with the roaming guidance outlined in ITU's E.212 documentation. As a result, if a device has a SIM with MCC 999 for a private network, that SIM can't roam onto public cellular networks or other private networks broadcasting national PLMNs.
- Private network SIMs can be used on multiple cellular networks by configuring the SIMs Equivalent Home Public Land Mobile Network (EHPLMN) list. Ensure the user's home network's PLMN and any additional PLMNs are listed in the EHPLMN file on the SIM.

Neutral host operation

- 5G MOCN support per 3GPP TS23.251 and TS 23.501

6.9 5G Network Slicing [optional - for future release of document?]

- 5G Network Slicing on 5G Standalone networks allows per slice specification of Quality of Service (QoS), involving network latency, throughput, and packet loss.
- This allows OnGo private networks to be shared across multiple types of applications and services, such as high-bandwidth video streaming, low-latency machine communications, and more business-critical applications.
- Typically, the MDM system assigns the 5G Network Slice to a Managed App on the UE using a Data Network Name (DNN) or an AppCategory