Band 54 4G/5G Spectrum for Private Networks

Click Here to Inquire

5 MHz of Contiguous Licensed TDD Broadband Spectrum

Goldilocks Mid-Band Frequencies Offer Capacity & Propagation Advantages

Ideal for Utility and Critical Infrastructure Industry Mission-Critical Applications

3GPP Standardized for 4G-LTE, 5G-NR, LTE-M and NB-IoT

Spectrum is Available Immediately Nationwide for localized leasing

FCC Regulations Support High Power Limits

Band User Benefits

Band 54 spectrum delivers a cost-effective, flexible solution while exhibiting superior performance for 4G & 5G deployments. These frequencies allow for decreased OPEX through enhanced propagation while preserving scarce bandwidth through efficient use.

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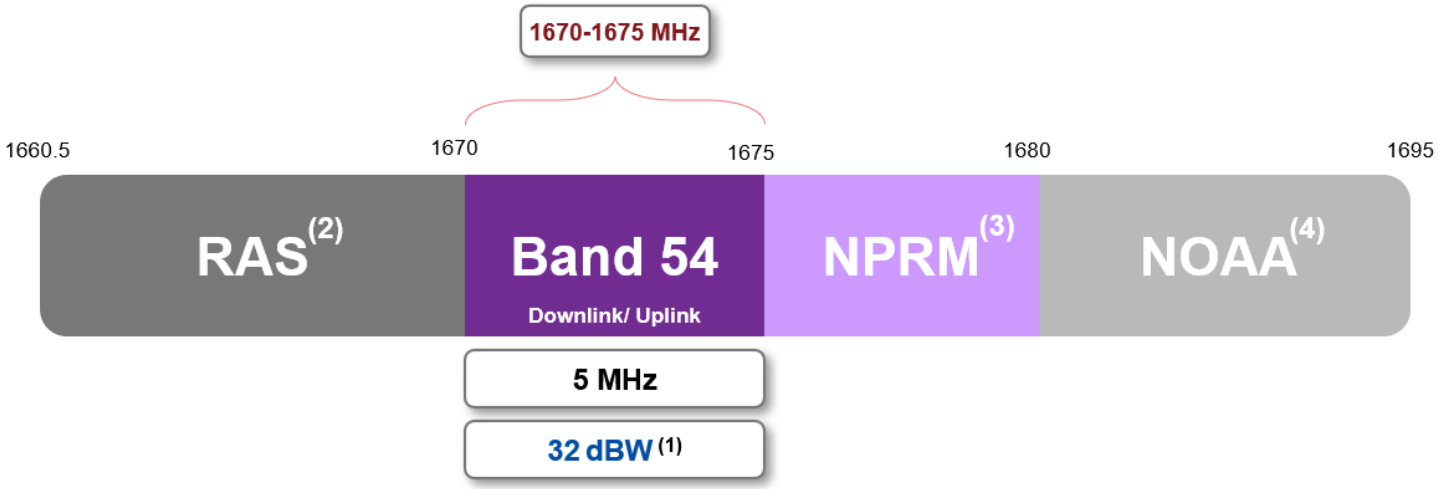
Band 54

1670-1675 MHz | 5 MHz Contiguous Bandwidth | Time Division Duplex (TDD) | Fixed/Mobile Operations



5 MHz of licensed spectrum at 1670-1675 MHz

Availability is *immediate* and *nationwide*

Transmit Power:

Base stations and fixed units: 2000 watts EIRP peak power; higher allowed in 30 CMAs[1]

Mobile stations: 4 watts EIRP peak power

Fixed or Mobile operations

Time Division Duplex (TDD)

Affords UCII users with **flexibility** to set their preferred **uplink to downlink** ratios, allowing users to apportion the available bandwidth according to their mission-critical application's unique requirements

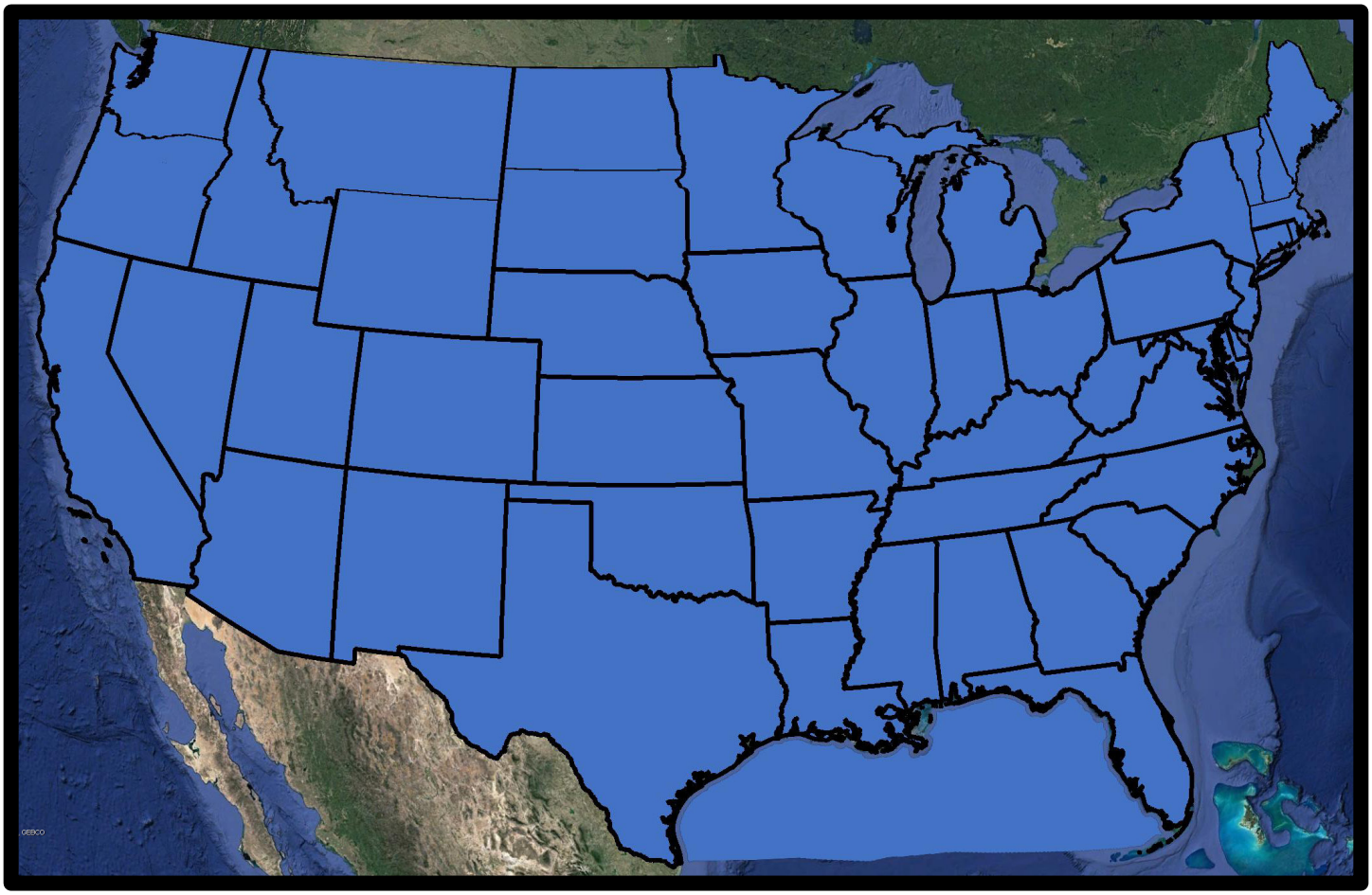
Fully 3GPP Standardized

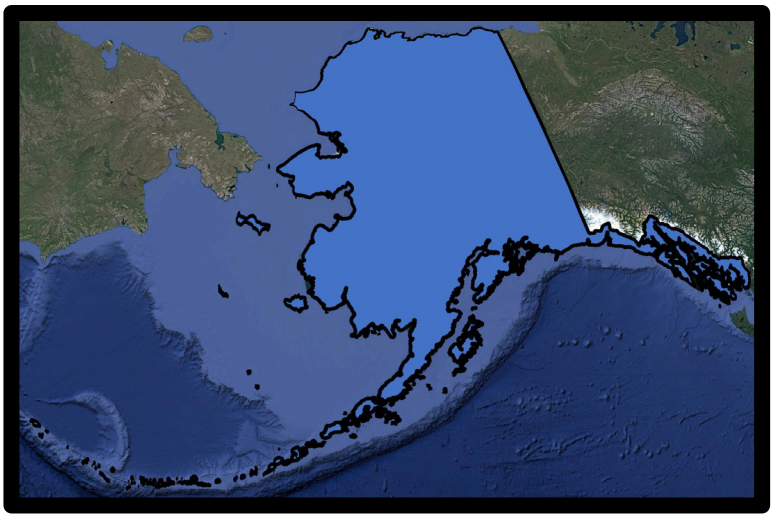
Provides the 1670-1675 MHz frequencies as Band 54 for **4G-LTE, 5G NR, NB-IoT** and **LTE-M** broadband operations

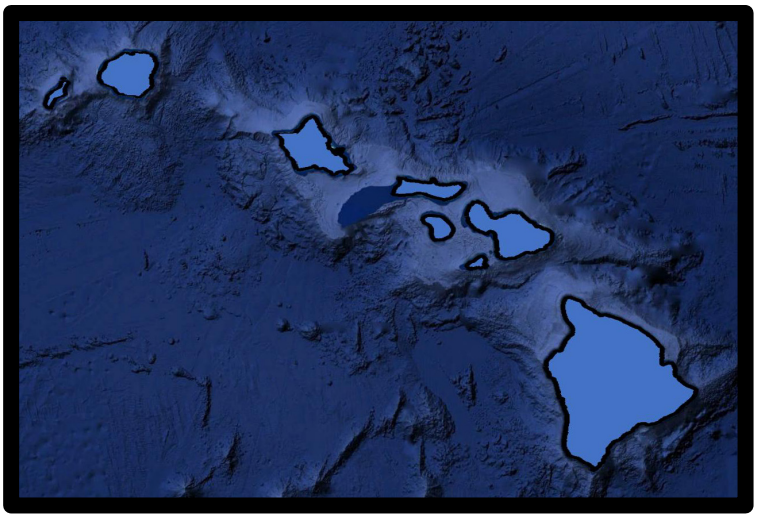
(1) Fixed and base station operations 2000 watts EIRP peak power, 4000 Watts/MHz in non-rural and 8000 watts/MHz in rural for 30 CMAs; Mobile stations limited to 4 watts EIRP peak power
(2) RAS (Radio Astronomy Service) is a global band designated by the International Telecommunication Union for radio astronomy research.
(3) NPRM (Notice of Proposed Rulemaking) is related to the NOAA spectrum from 1675-1680 MHz
(4) NOAA (National Oceanic and Atmospheric Administration) is a United States government agency that focuses on monitoring and predicting weather and climate in oceans and coastal areas.

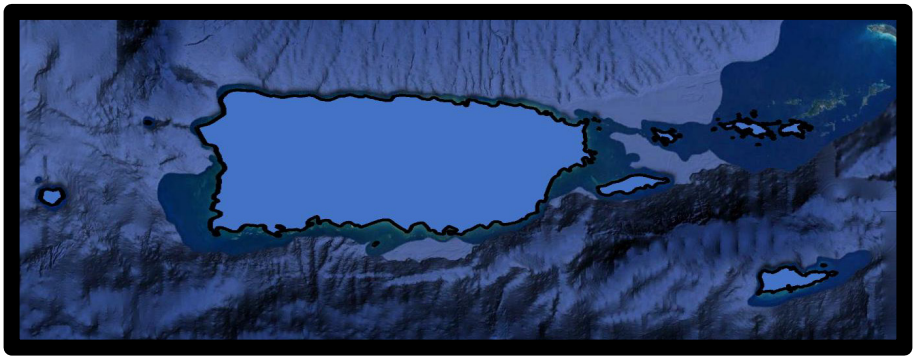
Band 54

1670-1675 MHz | Available Nationwide | Access Tailored to Meet Operators' Geographic Requirements









3GPP Standardization Status

The 1670-1675 MHz Frequencies have been standardized as Band 54 for **4G-LTE**, **5G NR (n54)**, **NB-IoT** and **LTE-M** broadband operations.

Band 54 is the *only* 5G approved frequency below 3 GHz that is widely available to utilities in the U.S.

#	Description	Technology	Status
1	4G Band Designation	4G-LTE	Completed
2	IoT Support	LTE-M / NB-IoT	Completed
3	5G Band Designation	5G-NR	Completed

3GPP Standardization Benefits

- ✓ Increased number of devices, infrastructure options and applications available to license holders – all major supplier expected to support 3GPP standardized bands over time
- ✓ Reduced base station costs and remote devices driven by economies of scale from the global mobile wireless industry
- ✓ Interoperability between base stations and devices from a variety of suppliers –based on 3GPP standard modules
- ✓ Ability to scale to millions of remotes if desired by private network operator
- ✓ Leverage security developments, security monitoring and security updates created for (and tested in) the mass market
- ✓ Continued support and upgrades available
- ✓ 3GPP standardization does not limit a utility from using or planning to use non-3GPP standard systems

Manufacturers and Ecosystem

Equipment manufacturers and ecosystem suppliers are modifying their 4G/5G base stations and end point devices to advance use of Band 54 frequencies for utility and critical infrastructure industry users.

GCT®

4G Chipsets
Available

Leading chipset manufacturer, GCT Semiconductor, is the first supplier of Band 54 compatible chips. **4G as well as LTE-M commercial chipsets** are currently available from GCT.

UBIIK

Ubiik has designed Band 54 **goRAN**™ LTE Base Station and a commercial solution is **expected to be available in 4Q '23**.

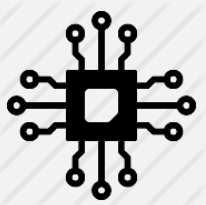
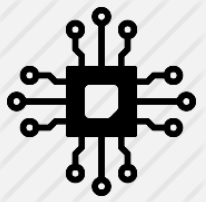
GE VERNOVA
Our portfolio of energy businesses

GE Vernova plans to develop solutions that will utilize **Band 54 4G/5G frequencies**.

PowerTrunk

PowerTrunk is committed to the development, promotion and implementation of end-to-end solutions that will utilize the **Band 54** in concert with **mission critical LMR bands** in a **combined system.**

Momentum with vendors developing base stations, chipsets, and devices for Band 54

Activity	Progress	Vendors
Device Filter Development	• Qualcomm has completed the device filter development (data sheet and testing complete). Available immediately for ordering.	
Chipset Development	• Commercial chipset available from one supplier supporting Band 54 LTE as well as LTE-M • Commitment from one chipset supplier for 5G support • Discussions underway with additional chipset vendors	GCT 
Device Development	• Evaluating initial device proposals and continuing discussions with other core module, and wireless router vendors	
Base Station Development	· Ubiik goRAN™ Band 54 LTE base station available in 4Q '23 · Technical diligence with major base station manufacturers complete. Further engagement on development program for 4G/5G base stations in-progress	UBIIK 

Band 54

1670-1675 MHz | Ideal for Fixed Use Cases | Leverage TDD for Uplink centric network traffic

Key Applications

- ✓ Mobile or Fixed Data Services (4G LTE & 5G NR)
- ✓ Advanced Metering Infrastructure (AMI)
  - Direct to Meter
  - Backhaul
- ✓ Supervisory Control And Data Acquisition (SCADA)
- ✓ Distribution Automation (DA)
- ✓ Industrial Internet of Things "IIoT"
- ✓ Field Area Network (FAN)

Additional Applications

- Distributed Energy Resources (DER)
- Fault location, isolation, and service restoration (FLISR)
- Line fault sensors with rapid line shutdown to prevent wildfires
- Video monitoring of assets
- VoLTE / Push-to-Talk (PTT)
- Substation monitoring and control
- Synchrophasor Networks and Phasor Measurement Units (PMUs)
- Replace expensive/cancelled legacy leased wireline links
- Microgrid management
- Smart poles
- CCTV (NERC/CIP) security monitoring
- Smart Grid monitoring and control
- Demand Response (DR)
- Volt VAR (Advanced Voltage Control)
- Reclosers
- Capacitor Banks
- Data Analytics & Business Intelligence
- EV stations
- Network, Device & Asset Management
- Machine to Machine "M2M"
- Vehicle tracking and maintenance
- Demand Forecasting data collection
- Asset tracking
- In rural areas, ISP service for customers with limited or no options
- Mobile wireless smartphone service for utility staff – increased coverage area and increased control and reliability
- Broadband Internet Services

Industries

- ➢ Electric, gas and water utilities
- ➢ Critical Infrastructure Industries "CIIs"
- ➢ Freight and Passenger Rail and other Transportation
- ➢ Oil, Gas, Solar, Wind, Nuclear and other Energy Production
- ➢ Pipeline Monitoring & Control
- ➢ Municipalities and other Government Organizations
- ➢ Public Safety

Band 54 Spectrum Rights Acquisition Process

1) **Inquiry** & Information Exchange
2) Non-Disclosure Agreement **(NDA)**
3) Price **Quote**
4) **Evaluation** and Diligence
5) **Negotiation**
6) Signature of **Definitive** Spectrum Rights Acquisition **Agreement**
7) Federal Communications Commission **(FCC)** Application Filing and Approval **Process**
8) Network **Deployment**