

الاجتماع الدولي الـ 25 لمراقبـــة ردايـــــو الفضـــــا

هيئة تنظيم Regulatory Authority State of Qatar دولة قطر

Name



Presentation Title



Communications هیئــة تنظیــم **Regulatory Authority** State of Qatar دولــة قـطـر

Spectrum Management in the State of Qatar



Advances in telecommunications technology may be unlimited, but the available spectrum that makes some of these advances accessible is a scarce resource. The demand for radio spectrum continues to grow and, therefore, must be regulated carefully. Bands of spectrum exist in layers, and it is the role of CRA to regulate radio spectrum to allocate frequencies so technologies and devices using radio spectrum can operate without interference. As the regulatory authority body that monitors access to spectrum, CRA's role is to carefully balance public and commercial interests in deciding allocation and assignment.



Koshy Abraham is a Communication Engineer with post-graduation in business administration and telecom management. He joined the CRA in 2008 and currently works with the spectrum monitoring section within the Spectrum Management department.

Communications	هيئـةتنظيــم
Regulatory Authority	الاتـصــالات
State of Qatar	دولـــة قـطــر

Spectrum Management in the State of Qatar

Qatar Demography and Telecom Sector

- 95% of Population reside in 35% landmass of Qatar.
- 4mn Mobile subscription.
- Mobile Penetration at 156%. (170% in Q2 '23)
- Fiber connectivity to 100% of households.
- Revenue for telecommunications services at QAR 11 billion. (2023)

Source: Telecom Market Q3 '23



CRA's Instruments for Spectrum Management



Emiri Decree 42 in 2014

- Regulate the communications sector,
- Ensure efficient management and allocation of scarce resources such as radio spectrum, numbering, and domain names.



Telecommunications Law promulgated by Decree-Law No. (34) of 2006 and the By-Law

- Regulating radio spectrum management.
- Resolve disputes arising between Service Providers, and between Service Providers and others.



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National Frequency Allocation Plan

- Provide a transparent, nondiscriminatory approach to spectrum management.
- Promote economic and societal benefits for all spectrum users.
- Public safety communications needs are met.
- Ensure interoperability of all available communications technologies.
- Support and promote innovation and competition.
- Reduce regulatory barriers to radio frequency access.
- Reserve appropriate spectrum for future innovative technologies.

CRA Strategy 2020-2024

- · Innovative and Growing IT sector
- Competitive and Innovation in Telecommunications
 Sector
- Strengthen Regulatory Regime to support Access to
 Digital Media



The ICT - Qatar's National Vision 2030

Smart Cities and Digital Infrastructure

- · Lusail City and Msheireb Downtown Doha.
- High Speed Internet, IoT-based services, viz. traffic

2

Digital Economy Growth

 Development of a diversified, knowledge-based economy; fostering entrepreneurship and innovation

3

ICT for Education and Healthcare

• E-Learning, EdTech, Telemedicine and Healthcare

6

Enhanced Global Connectivity:

- Regional Telecom Hub, Submarine cable networks and Enhanced satellite communication capabilities
- International Partnerships and Collaboration

ICT Infrastructure for Government and Business

5

Sustainability through Telecom

• Energy Efficiency in Telecom Infra, Smart Grid Solutions.

National Security and Resilience

- Cybersecurity in Telecom
- Emergency Response Networks

8

Inclusivity and Digital Access

- Broadband for All
- · Bridging the Digital Divide

Strategic Projects

Automated Frequency Management (AFMS) - Upgrade with flexibility to support any Global events including Test and Tagging of radio equipment.

Automated Spectrum Monitoring System (ASMS) - Nationwide ASMS to enhances the monitoring coverage at all venues during the FIFA World Cup with 3 Hybrid Stations, 13 TDOA sensors, 2 Transportable TDOA sensors and 2 Mobile Monitoring Stations.

Space Radio Monitoring Centre (SRMC) - Monitoring of GSO/NGSO satellites in the visible arc. Identify and Geolocate Transmitters. Monitor, Geolocate and Track Mobile VSAT terminals.

Drone Detection System (DDS) - Reliably detect, classify and locate unauthorized radio-controlled drones and their operators within a shield area during high-profile events.

EMF Emission tools - Selective measuring equipment for electromagnetic fields (EMF) for demonstrating safety and environmental compatibility.

Quality of Service Measurement Tools - Drive test Vehicles and handheld tools for Annual Network Audits on the mobile network.

Smart Analytics and Remote Probes - Remote Quality of Service (QoS) measurements of Mobile network in all stadiums and major venues.

Mobile KPI Monitoring Dashboard - Remotely Monitor the Key Performance Indicators of both Service Providers QoS in near real time on a centralized dashboard.









Spectrum Monitoring Network History

2001

- (2) Fixed MS Sites
- (2) Monitoring Vehicle.

2010-2016

- National Monitoring Center
- (4) Fixed Sites
- (2) TDOA Sensor
- (2) Mobile Monitoring Stations

2018-2022

- (+3) Hybrid Sites
- (+13) TDOA Sensors
- (+2) Mobile Hybrid Sites
- (+2) Portable TDOA Sites







Spectrum Monitoring Network

Planning Considerations ...1

Primary Network

- +3 Hybrid sites.
- 40m/80m height for wider coverage.

Network Improvements

- Blanket AoA coverage with 35dbµv/m in Target Area.
- · Location accuracy improved with a miss around 2km in Target Area.



Ref: SM.2356-2 (06/2018)

Planning Considerations ...2

Secondary Layer (TDOA)

- 15 TDOA Sensors
- 20m height (Roof tops).
- Ease of installation and Cost effective
- Target Accuracy with nodes at 7.5km

Network Improvements

• Better the accuracy of Location Coverage to <200m.



Computer Simulation Modelling

Simulation Tool Parameters

- TCI geolocation performance estimator
- Propagation model: Terrain integrated
- TX height: 1.5m Power: 10W
- Accuracy: AOA (20RMS DF accuracy
- TDOA (Time accuracy 200 ns)



Legend

- · Color scale represents the miss distance.
- Areas shown in red have a large miss distance >1000m beyond which the coverage area is limited
- Areas in blue and violet are areas with the least miss.



Implementation • Actual Hybrid • Actual Hybrid • Actual TDOA • Planned Locations Challenges

Related factors

- Proximity to transmitters.
- Availability of Roof tops.
- Land Acquisition process.
- Network Connectivity.

Mitigation of Coverage holes

- 2 Transportable TDOA sensors @10m height.
- Strategic positioning of Mobile Monitoring for Geolocation.
- Spectrum Analyzers and Automatic Direction-finding systems during Matches in all stadiums.





Site optimization post World Cup

Relocate TDOA sensors

- Prioritize Primary Network (Hybrid) in Qatar.
- Enable DF and Geo Location capabilities for Spillover Monitoring.
- Geolocation coverage in Urban areas.

Go Green

• Renewable power.





IMT Network Coverage & Quality of Service Monitoring

QoS Instruments

- Annexure G :Spectrum License
- QoS Policy & Regulatory Framework

QoS Measurement

Drive test tools

- Dedicated Drive test Systems on vehicles
- Pedestrian systems

Automatic Probes

- 100 terminals live monitoring
- Metro stations, Malls, Airport etc..

KPI Dashboard

- Availability, Integrity
- Service Provider OSS data
- Daily statistics.





Coverage/QoS Obligation

IMT-Advanced (4G)

- 98% of the primary landmass of the State of Qatar.
- -100 dBm at >= 95% of 100m x 100m
- Average DL data rate above 20 Mbps. and Adequate Indoor Coverage

IMT-2020 (5G)

Spectrum Releases

Release 1

- December 2018
- 100 MHz of spectrum in the 3.5 GHz band

Release 2

- Dec ember 2021
- +100 MHz blocks in the 3.5 GHz &
- (2) x 400 MHz blocks in the 26 GHz band

Release 3

- TBD
- 10 MHz blocks in the 700 MHz band

Timeline

Phase 1

- July 31, 2022
- DL capacity of 600Mbps in each outdoor sector
- 100% cells in the Urban polygon (FWC) Phase 2
- December 31, 2023
- 100% cells in Qatar 600Mbps /sector
- 50% cells with aggregate DL capacity 1.5Gbps
 Phase 3
- December 31, 2024
- 100Mbps average download speed





Coverage/QoS Obligation

Ongoing Spectrum Activities

Refarming the 2.6Ghz from FDD \rightarrow TDD (ongoing)

- Band Harmonization in the region
- +100Mhz spectrum in the 2.xGhz band for Service providers
- Higher speeds
- Improved spectral Utilization
- Improved Spectral Efficiency

Legacy technology Sunset

- 3G /IMT 2000 phase out to be planned for December 31, 2025
- Import of 2G and 3G only handsets stopped
- Type approved VoLTE mandated on all UE's



Space Radio Monitoring Center

- Geolocation and Monitoring in GSO and NGSO.
- Mobile VSAT Geolocation Track and geolocate VSAT terminals.
- Tactical Mobile Monitoring of Space Radio.
- Last Mile Interference Hunter-RF Monitoring Drone.



CRA Qatar Global Collaboration

- CRA is an active member of ITU and the regional offices for Spectrum management.
- CRA will be hosting the ITU PP 2026
- Key Collaborations include Memorandum of Understanding (MoU) for Spectrum Monitoring with Regulators:
 - Enhance cooperation in spectrum monitoring
 - Exchange of experiences in Satellite Projects
 - Training & Development of Competencies in Spectrum Monitoring



TRA, Oman 2019

CRMS, Republic of Korea

November 2023

ANACOM Romania February 2024

ANATEL Brazil Ongoing

Thank you

