



U.S. AGENCY FOR  
GLOBAL MEDIA

UNITED STATES  
BROADCASTING  
BOARD OF  
GOVERNORS

# Spectrum Usage

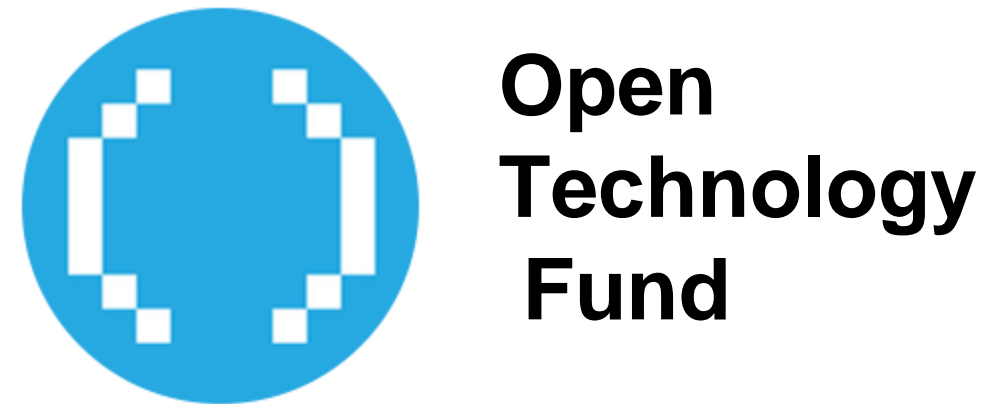
**Ken Claerbout**  
**Broadcast Technologies Division**  
**Transmission Engineering Directorate**  
**Technology, Services, and Innovation (TSI)**



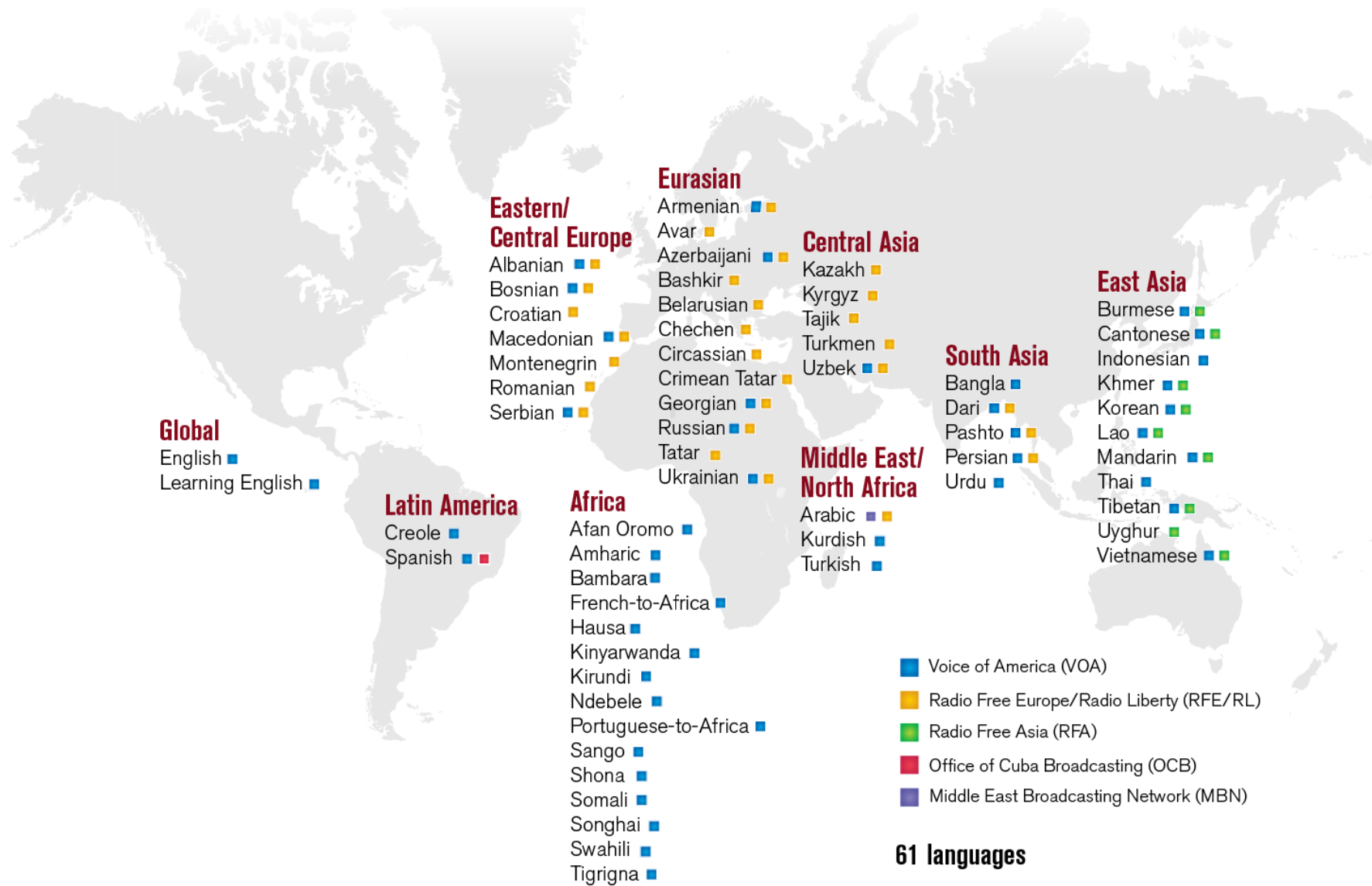


# **USAGM MISSION**

**To inform,  
engage and  
connect  
people  
around the  
world in  
support of  
freedom and  
democracy**



# BBG Broadcast Languages





# USAGM Worldwide Operations

## FACILITIES

5

Networks  
VOA, RFE/RL, OCB, RFA, MBN

4

Cities with  
Headquarter Offices  
Washington, DC  
Springfield, VA  
Miami, FL  
Prague, Czech Republic

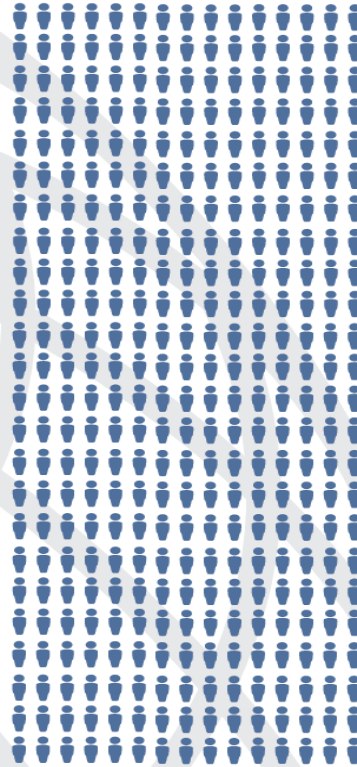
6

Marketing Offices  
Washington, DC  
Miami, FL  
Prague, Czech Republic  
Accra, Ghana  
Johannesburg, South Africa  
Bangkok, Thailand

54

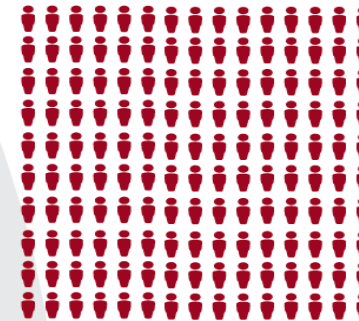
Bureaus and  
Production Centers

## PEOPLE = 10 people



3,592

Journalists, Technical  
and Administrative Staff  
at Headquarters and  
Corporate Offices



1,500

Stringers and Correspondents  
Reporting from Around the Globe

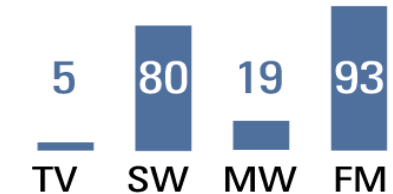
## DISTRIBUTION

96

Transmitting Sites

197

Operational  
Transmitters



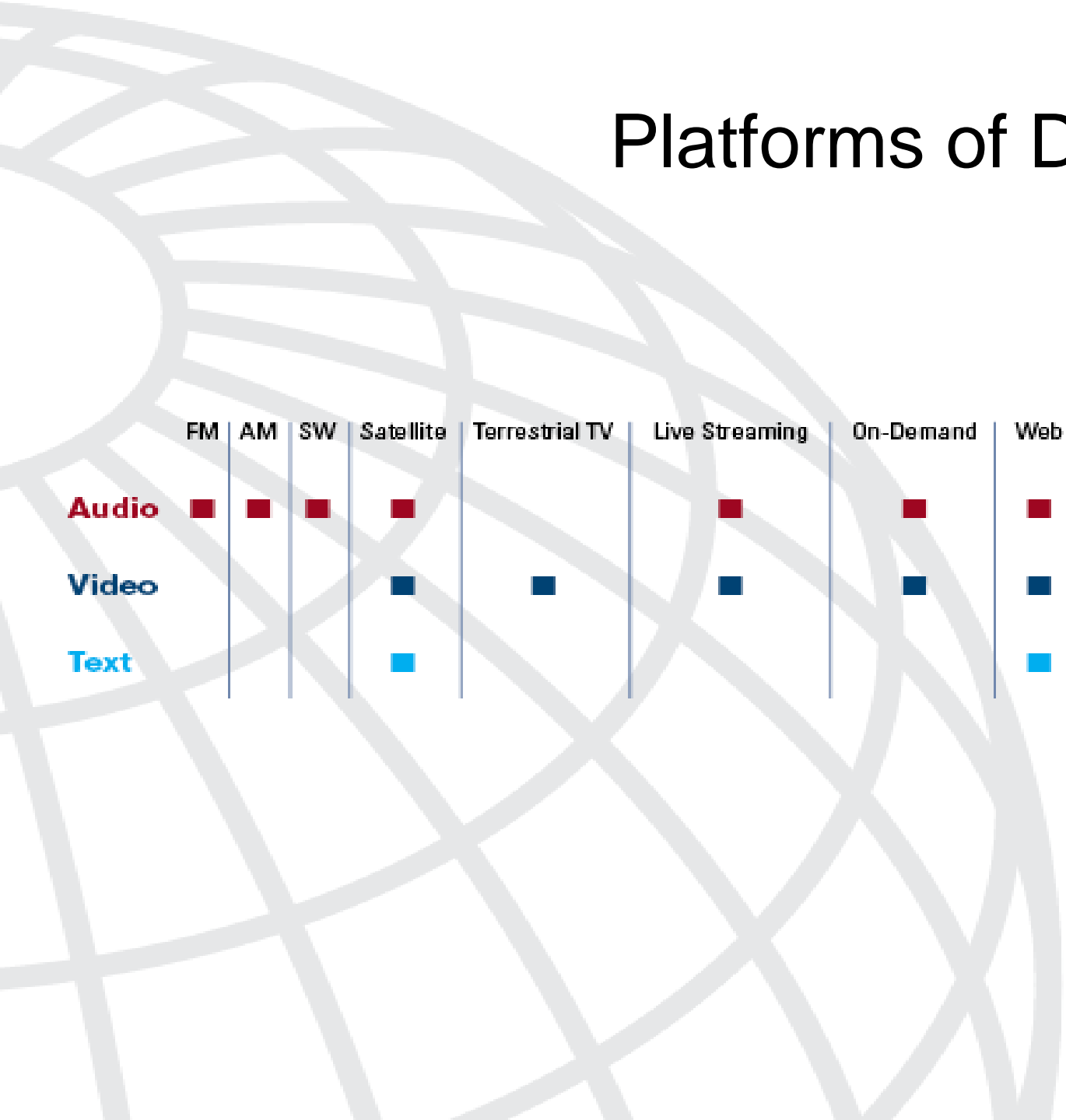
2,300

Affiliate Stations

16

Satellites

# Platforms of Delivery



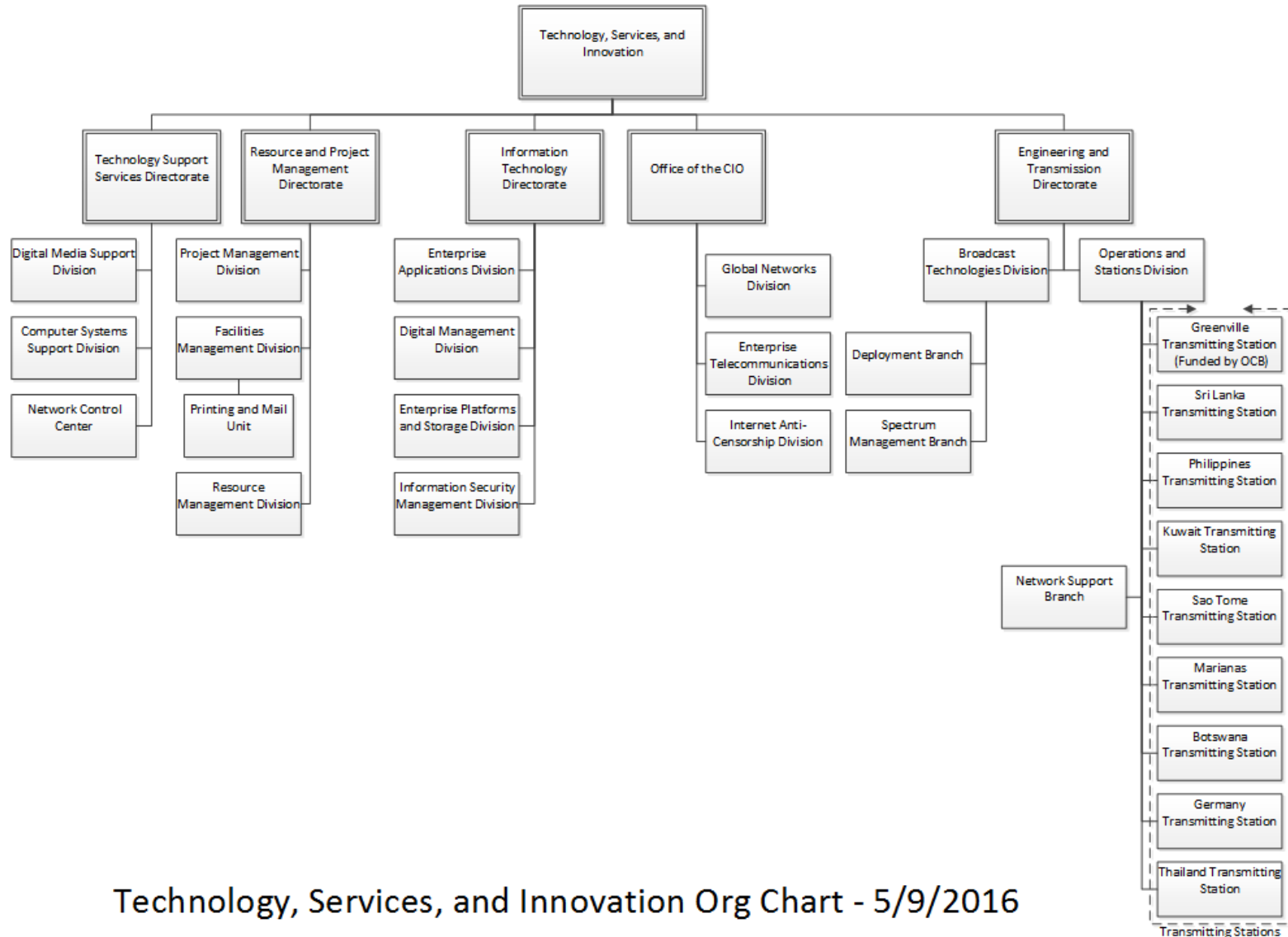
	FM	AM	SW	Satellite	Terrestrial TV	Live Streaming	On-Demand	Web	Mobile	Social Media	E-mail	SMS	DVD/Flash Drives
<b>Audio</b>	■	■	■	■		■	■	■	■	■			■
<b>Video</b>				■	■	■	■	■	■	■			■
<b>Text</b>				■				■	■	■	■	■	■

The Voice of America's weekly unduplicated audience reached 278 million in Fiscal Year 2020, according to the new [performance and accountability annual report](#) released November 16 by VOA's parent agency, the U.S. Agency for Global Media.





# Technology, Services, and Innovation



# Broadcast Technologies Division

- Propagation analysis and coverage prediction – MW, SW, VHF, UHF
- FM system design, implementation, modification, and operations
- MW system design, implementation, and modification
- SW system design, implementation, and modification
- Terrestrial TV design and implementation
- SW frequency scheduling, international coordination
- Worldwide monitoring
- Broadcast time leasing on SW and MW

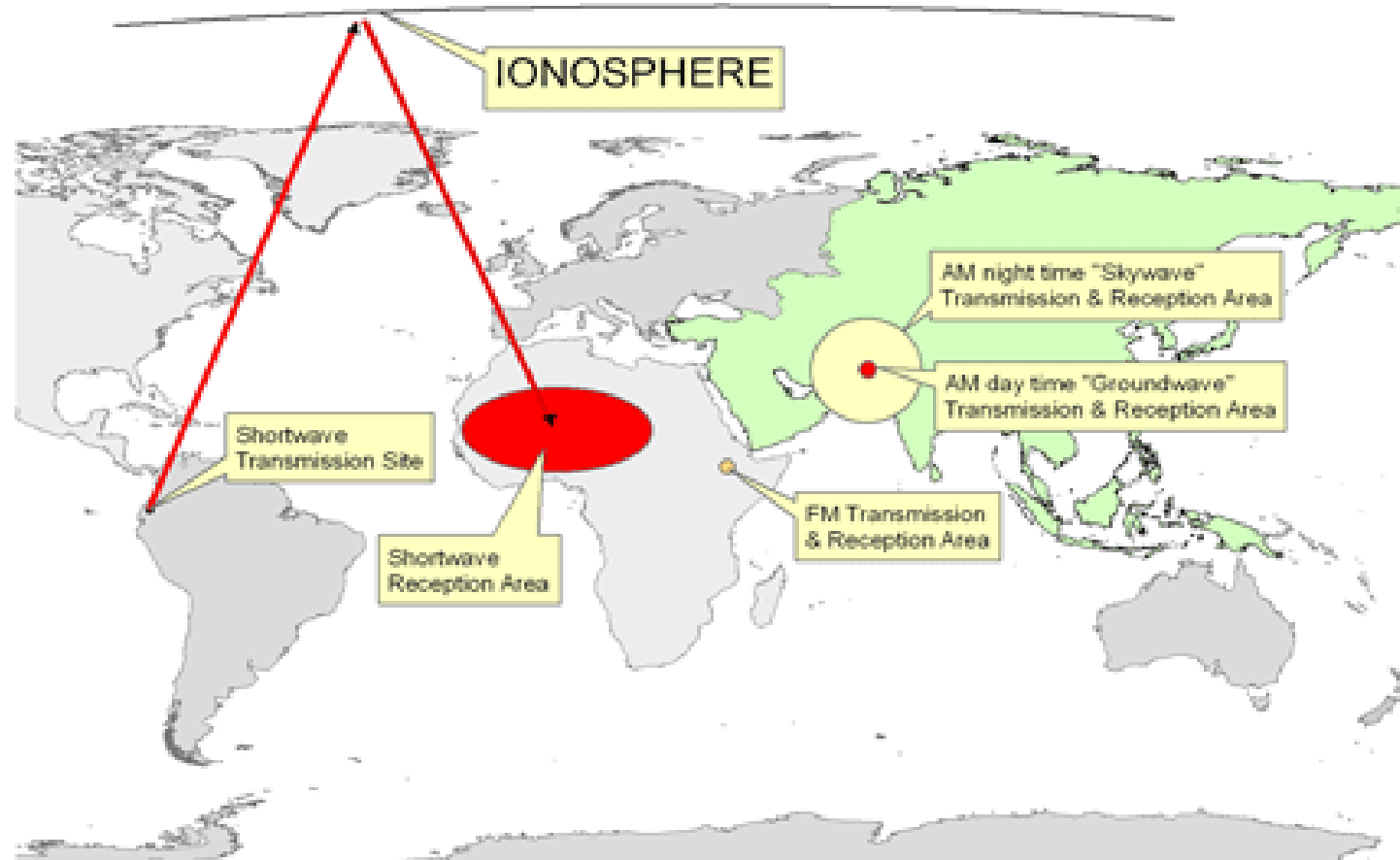
# BBG Spectrum Related Activities



**IBB Poro (Philippines) Transmitting Station**

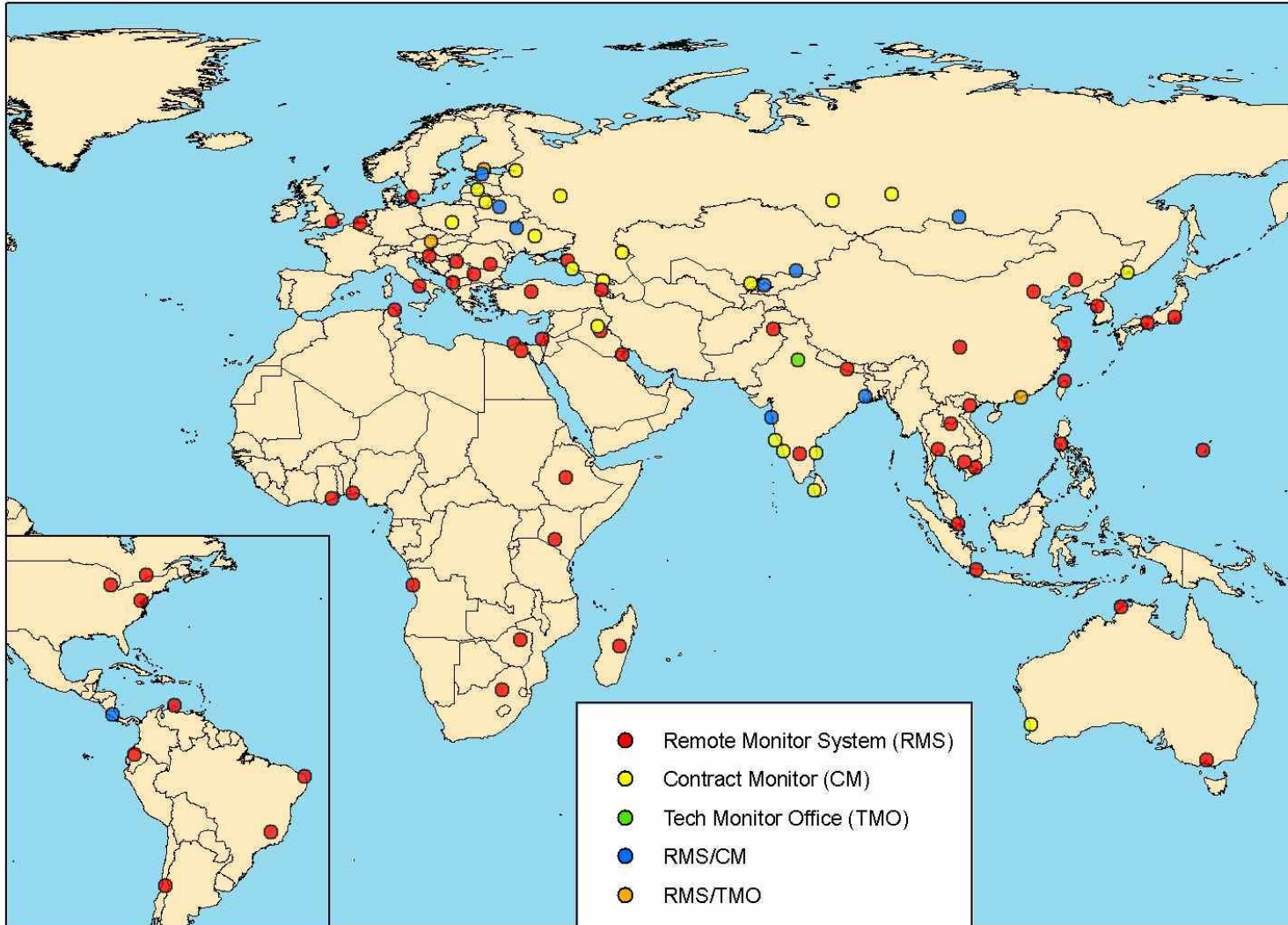
# BBG Transmission Network

Shortwave, Medium Wave, and FM Coverage  
Representing distances achievable in typical cases



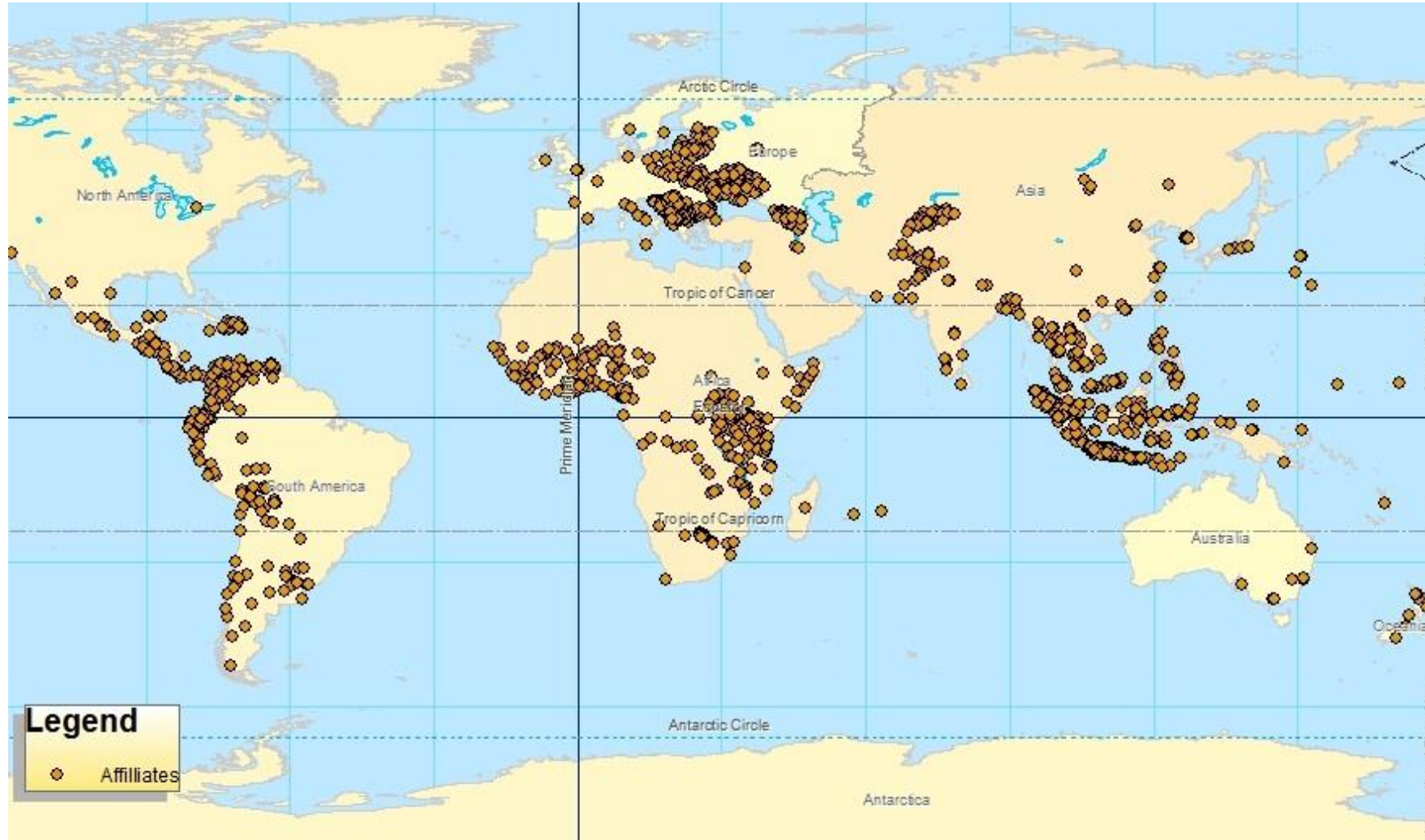


# IBB Technical Monitoring Resources



3 Monitoring Offices  
7 Full Time Monitors  
30 Contract Monitors  
70 Automated Sites

# Affiliate Stations



# Shortwave Transmitting Stations





# Sao Tome Transmitting Station







# High Frequency (HF-Shortwave) Spectrum

- US based facilities licensed by NTIA
- Non-US facilities licensed by host country
- Frequencies coordinated internationally  
(High Frequency Coordination Conference- HFCC)
- Frequencies may be coordinated by BBG or host country
- ITU – Coordinated frequencies reported by BBG or host country

# Medium Wave Spectrum

- Apply to host country for a frequency
- If the frequency and requested power level are available (follow ITU rules) assignment is made
- New power level, antenna pattern change
  - notify ITU who puts out a notice with comment period
- ITU has no enforcement mechanism
- No interference protection afforded outside of a country's border.

# FM Spectrum





# VOA Juba, South Sudan



**93.5 MHz**  
**1,000 Watts**



# VOA Brazzaville, Republic of Congo – 104.3 MHz

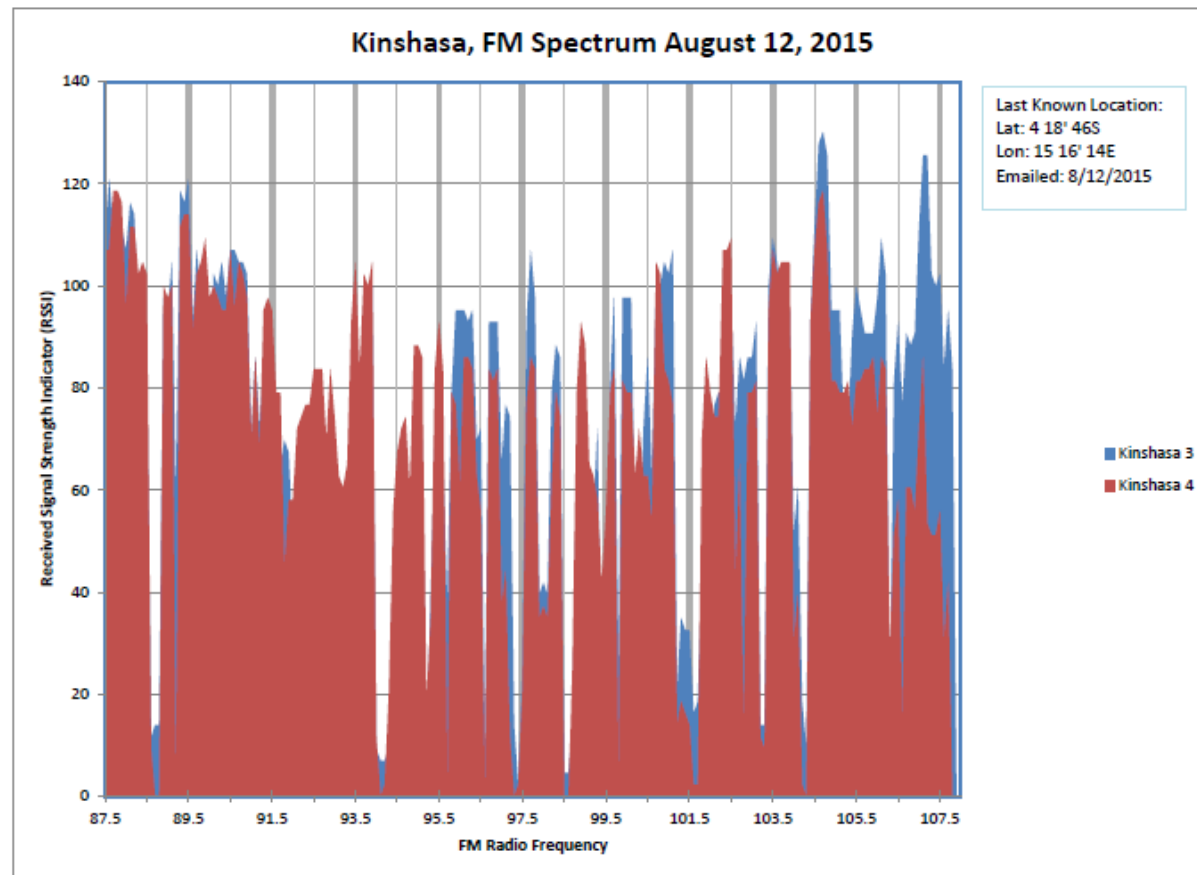


# FM Spectrum

## VOA License Applications

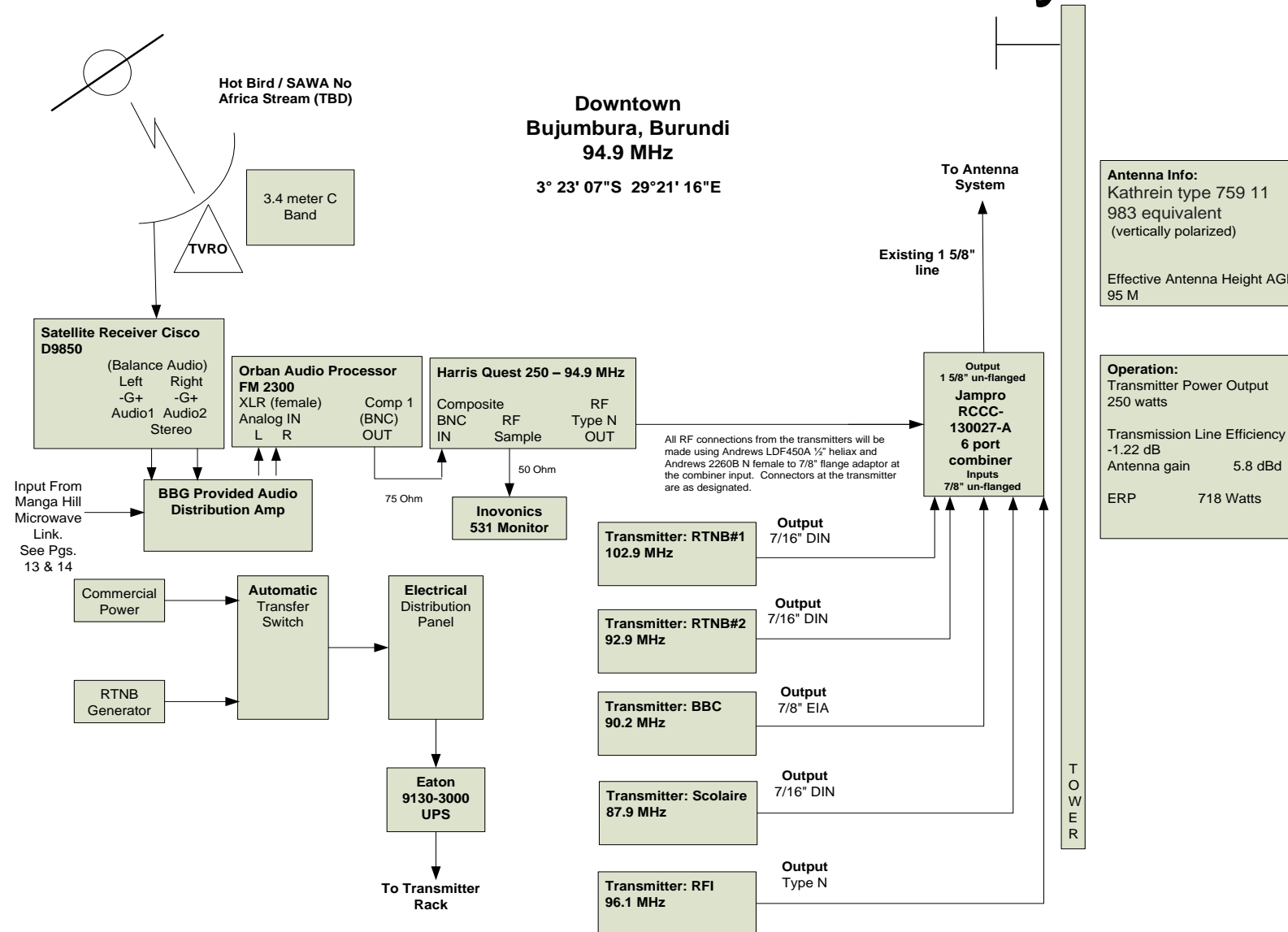
- **Application often begins with the Ministry of Information (content – not technical)**
- **We often accept the frequency assigned by the host country. Frequencies are becoming scarce!**
- **But there are times when we need to work with the host government Ministry to find solutions to technical issues**

# FM Spectrum – Why Coordination is Important!





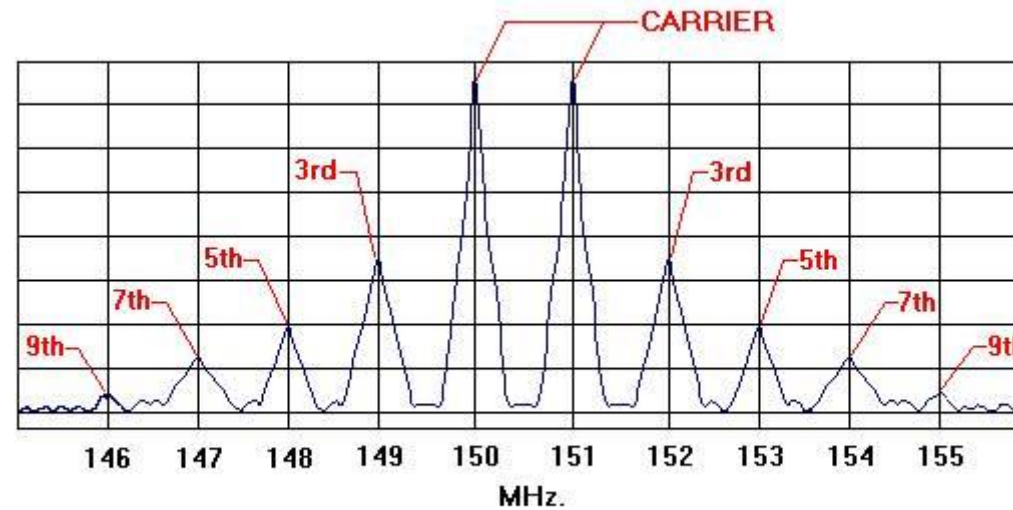
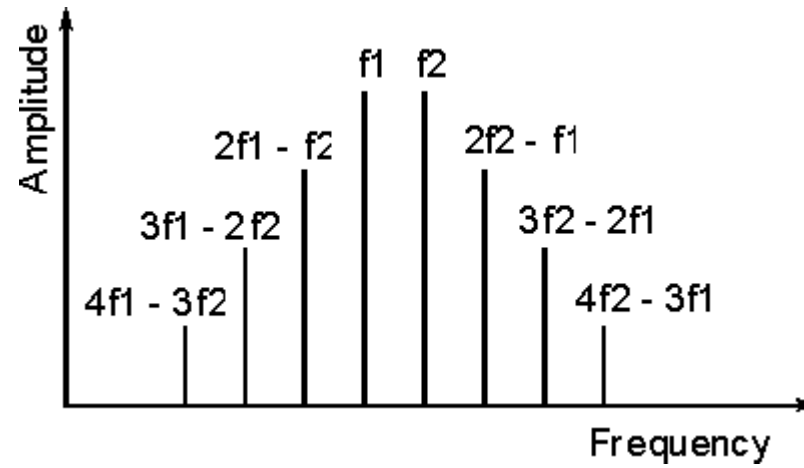
# VOA FM Transmission Systems



# Frequency Interference



# Frequency Interference



Spectral Display of Carriers and 3rd, 5th, 7th and 9th Odd Order Products

# VOA FM Transmission Systems



**Minimum combiner spacing is typically 800 kHz  
But more like 1 – 2 MHz**

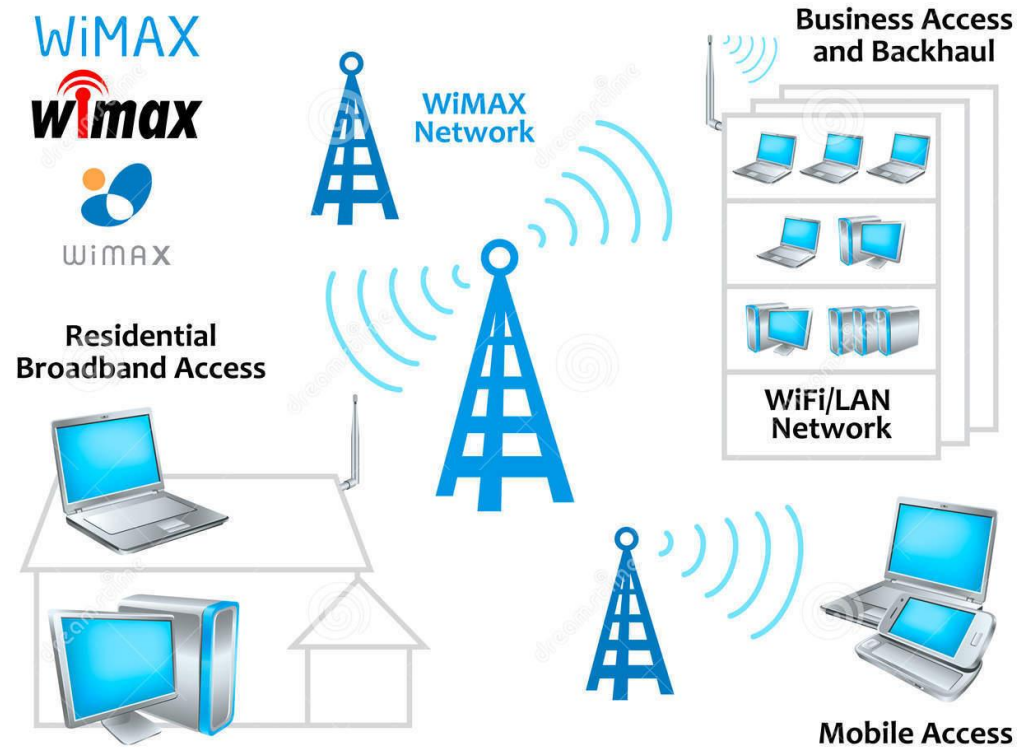


# Frequency Interference





# Frequency Interference



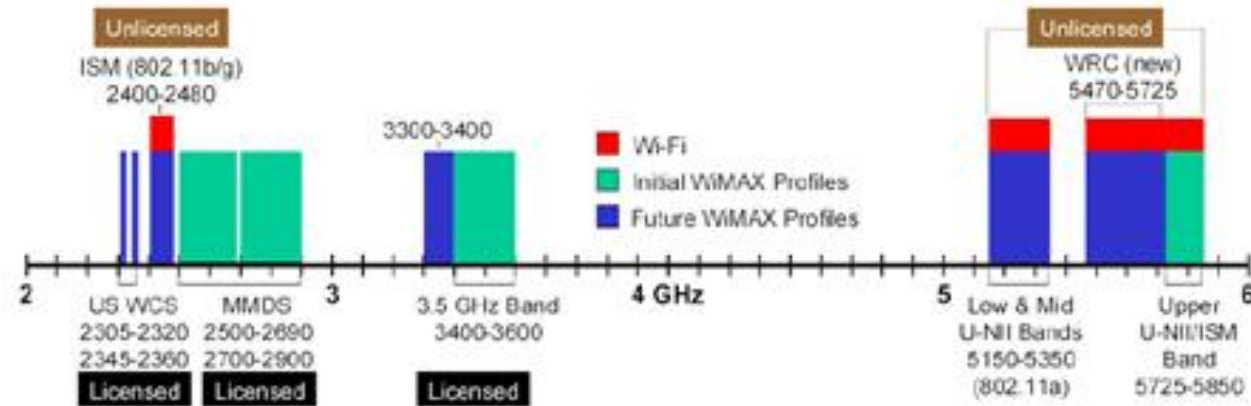
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# Frequency Interference



# Questions?

## Thank You For Your Time

