Rockwell Collins
Building trust every day

GLOBALink Voice Services

HF Fundamentals Briefing

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Presented by Tony Diaz and Donald Dalia

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Rockwell Collins HF Voice covers 25 million square miles of Oceanic Airspace

Approximately 200,000 messages per month

We has been the HF Voice of the FAA for over 60 years

Clearances delivered in less than 3 minutes

Requests and Advisories delivered in less than 5 minutes

With an error rate of less than 1 per million

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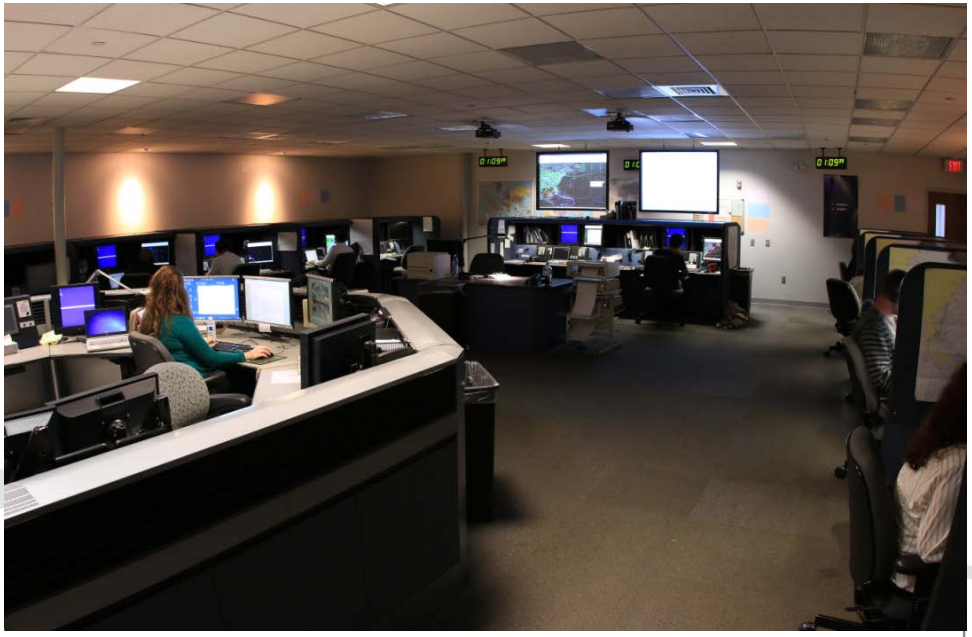
Rockwell Collins IMS HF Voice Services

- We operate 6 HF Voice radio sites to cover ATC and AOC communications from the North Pole to South America
- 15 HF radio sites compliment our HF voice services with HFDL with worldwide coverage
- 100 Radio Operators staff 25 positions and operate 60 HF frequencies and 11 VHF radio nets



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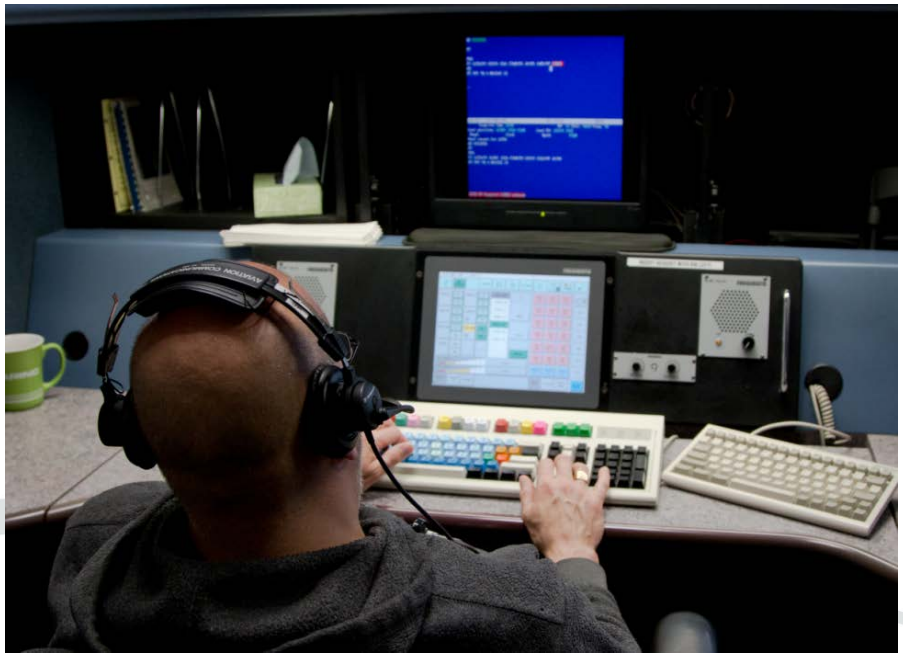
Rockwell Collins IMS HF Voice Services

- Rockwell Collins' air/ground international voice service connect far-reaching corners of the world. The radio operators at these facilities also control remote, high-powered HF radio sites

The air/ground international service is used to:
Coordinate ground and flight activities—ARTCC's and Airlines can better control and track aircraft, allowing more efficient handling Oceanic and Ground operations



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Rockwell Collins IMS HF Voice Services

- Rockwell Collins' radio operators are on duty 24x7. They handle messages by:
  - Sending transcribed messages to any IMS data network service, subscriber, or any International Civil Aviation Organization address, worldwide
  - Establishing a phone patch between aircraft and any ground facility
  - Delivering ground-originated calls to aircraft anywhere in the coverage area

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HF RADIO & SELCAL CHECKS

- **NYC Communication Center's LDOC Facilities**
  - (NYC) Riverhead, New York
  - (VVI) Santa Cruz, Bolivia
- **SFO Communication Center's LDOC Facilities**
  - Barrow (Barrow, Alaska)
  - Guam
  - Pacific (Molokai, Hawaii)
  - Dixon (Dixon, California)
  - Hat Yai, Thailand/HDY

- All the above LDOC Facilities utilize the exact same frequencies
  - **21964**
  - **17925**
  - **13348**
  - **11342**
  - **8933**
  - **6640**
  - **3494**

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SATELLITE COMMUNICATIONS

1. **Inmarsat** – Aircraft are assigned discrete octal codes. Equipment is permanently installed in aircraft. System consists of 4 geo-synchronized satellites.

**Both communication centers have a database of SAT phone numbers assigned to particular registration numbers.*

NYC SatVoice – 436623

SFO SatVoice - 436625

2. **Iridium** –System consists of a constellation of LEO (low earth satellites).

When calling via either of these satellite communications service providers, use the same procedures as though calling by radio. Also, be advised when calling via SAT-voice, you could be speaking with a different operator than the one you spoke with on HF.

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Rockwell Collins HF & VHF Frequencies

Both the SFO and NYC stations assign HF & VHF frequencies for air/ground ATC communications with aircraft operating in the following FIRs.

- New York
  - New York
  - Miami
  - Piarco
  - San Juan CERAP
- San Francisco
  - Oakland
  - Honolulu CF
  - Anchorage Oceanic
  - Guam CERAP

Both communications centers have the capability of sending messages to FIRs other than the ones listed above.

- *Example:* If aircraft are unable to contact Bogota Control, the Rockwell Collins IMS Communications Centers can send a message to them on your behalf.
- Link to Jeppesen Charts

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Services Provided on LDOC HF

- HF Radio & SELCAL Checks
  - Contact RC IMS Communications Center Operations 24 X 7 for HF troubleshooting and recommended frequencies:

NYC ARINC RADIO
IATA- NYCXGXA
AFTN/ICAO- KNYCXAAG
E-MAIL- nycradio@arinc.com
PHONE- 631-589-7272

SFO ARINC RADIO
IATA- SFOXGXA
AFTN/ICAO- KSFOXAAG
E-MAIL- sforadio@arinc.com
PHONE- 925-294-8297

- Communications Centers can provide Flights with:
  - Phone patches with company
  - Phone patch to in flight medical providers
  - Weather Information (METARs, TAFs, FAs, SIGMETS, Winds Aloft, etc.)

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Services Provided on LDOC HF

Contact the appropriate Rockwell Collins Communications Center in order to obtain suitable primary, secondary and alternate HF frequencies for the aircraft's area of operation.

Provide Comm Center Operations with the following information:

1. Filed flight identification
2. SELCAL code
3. Routing and approximate location (Waypoint or Latitude and Longitude)

Example:
XXX123, SELCAL ABCD, SBGR 1200Z - KMIA 2130Z IN THE VICINITY OF 15N 068W

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Services Provided on LDOC HF

- Flight ops can contact NYC for regular LDOCF frequency forecast messages in order for flight crews to have appropriate HF frequencies to contact dispatch or make regular position reports.

- Example Message

PLEASE USE THE FOLLOWING FREQUENCIES WHEN ATTEMPTING TO CONTACT NEW YORK ARINC

	SOUTH AMERICA {20N & SOUTH}	CARIBBEAN & N. ATLANTIC
PRIMARY:	8933	6640
SECONDARY:	11342	8933
ALTERNATE:	13348	3494

	NORTH AMERICA {NE AREA}	EASTERN ATLANTIC (WEST AFRICA)
PRIMARY:	6640	21964
SECONDARY:	8933	17925
ALTERNATE:	3494	13348

Team Leader
NYC Communications Center
ARINC
Bohemia, New York USA
631.589.7272 (operations)
631.589.7283
nycradio@arinc.com
AVINET: NYCRAXA

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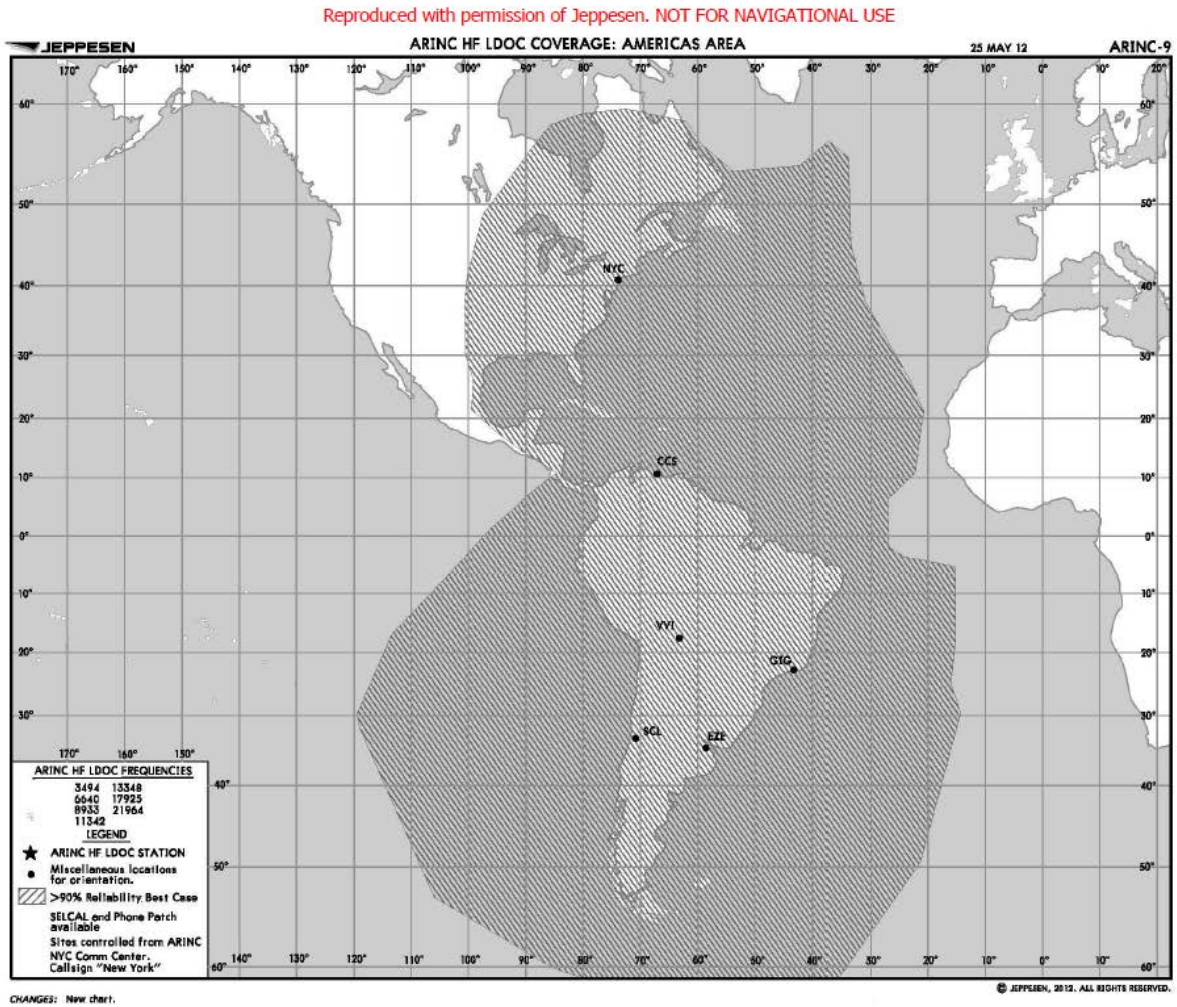
NYC / Bolivia LDOC

LDOC Frequencies
21964
17925
13348
11342
8933
6640
3494



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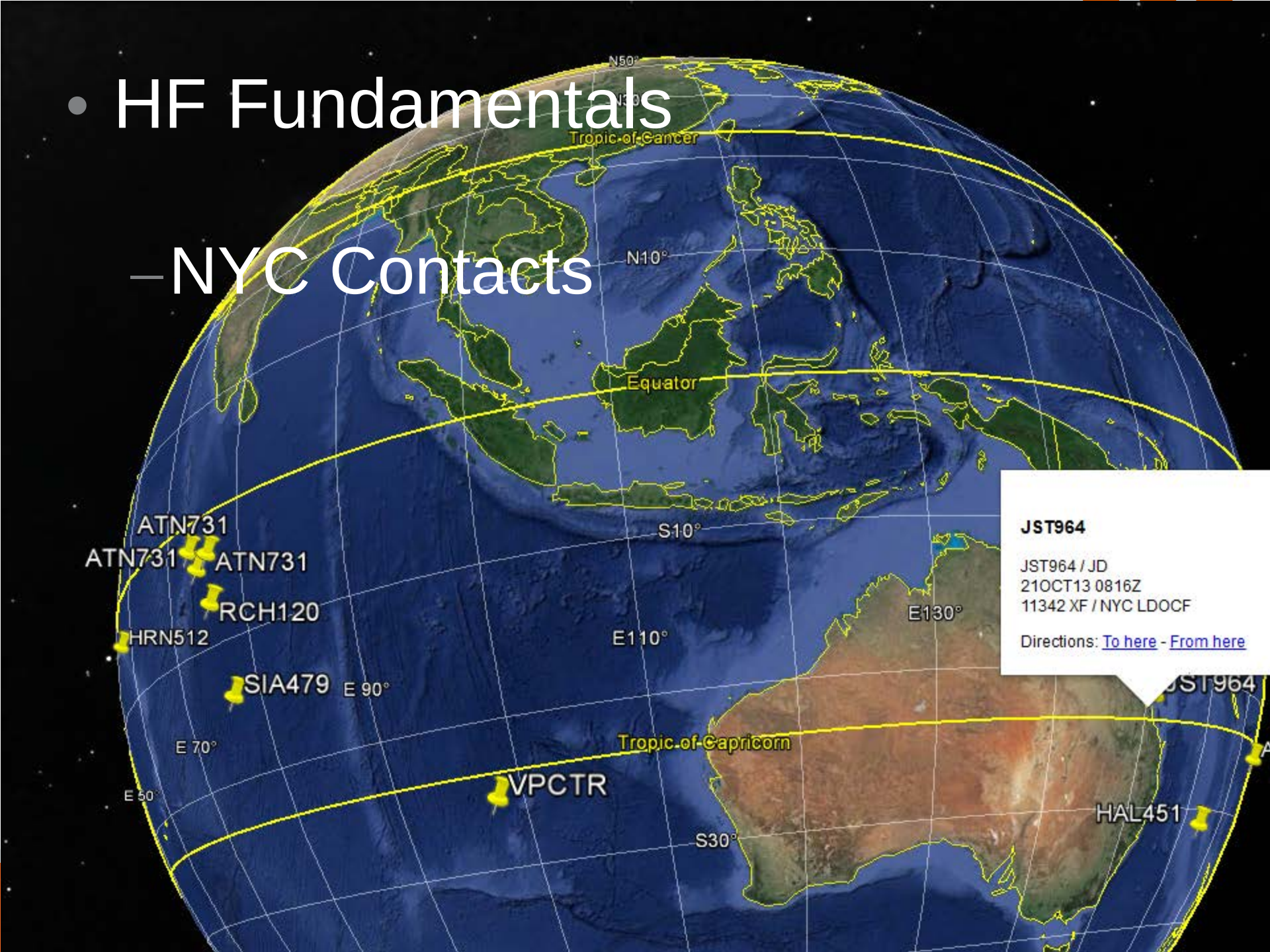
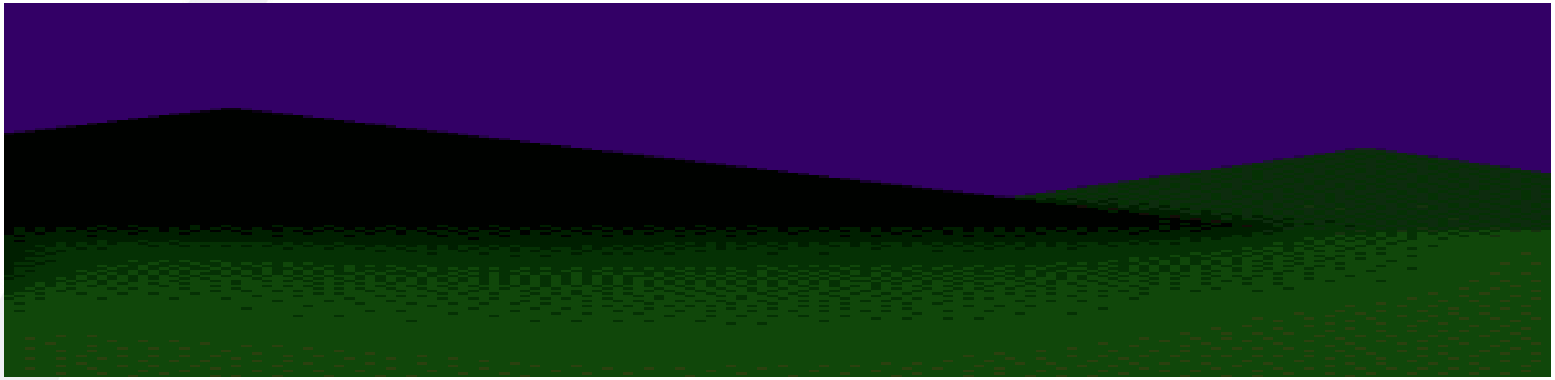
- HF Fundamentals
  - NYC Contacts



HF Frequency Propagation – **“Follow the Sun”**

The saying “*Follow the Sun*” in radio refers to the choice of what frequency to use. When the sun is low, the frequency in use should also be low.



Just as the sun gets higher during the day, the frequency in use should also get higher.

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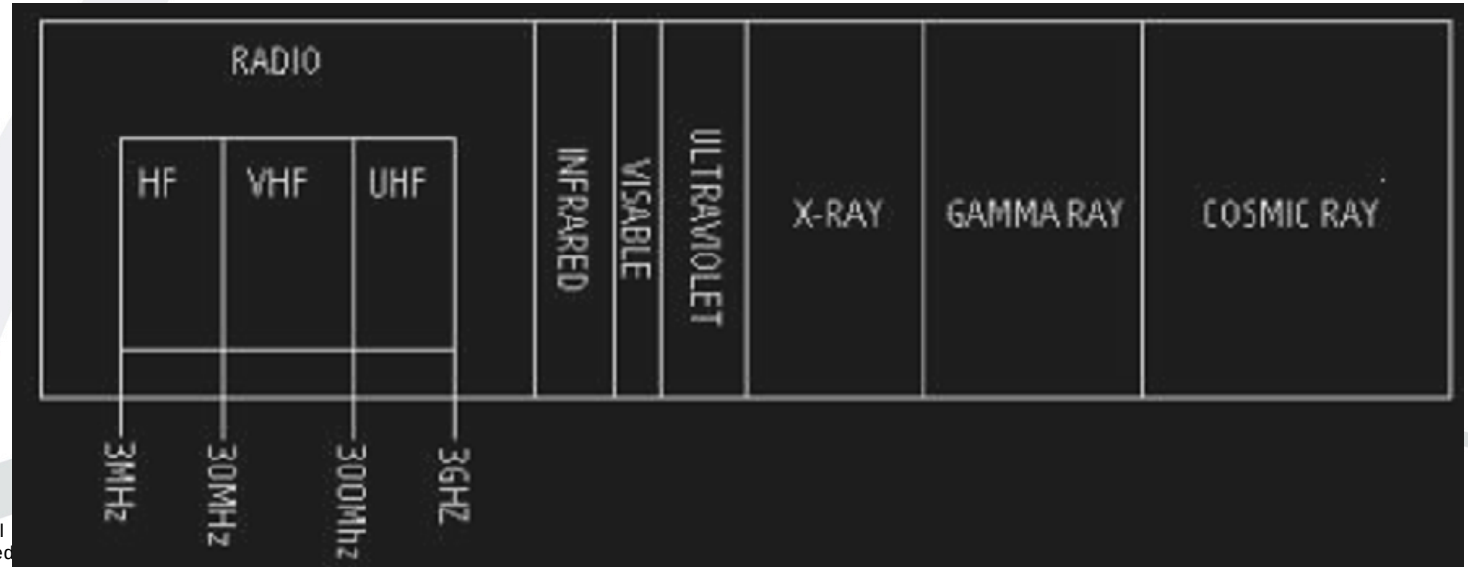
RADIO WAVE PROPAGATION

- High Frequency ***(HF)*** radio waves (3 to 30 Megahertz) have the ability to travel over extremely long distances.

- HF radio waves have the property of being reflected or refracted by the ionosphere much as a mirror reflects light and a lens bends it. HF waves can also be reflected by the earth's surface as they are refracted by the ionosphere. The reflecting and bending of the radio waves is what allows the signal to travel long distances beyond the Earth's horizon, or beyond the line of sight.

- This movement of radio waves is called **Propagation.**



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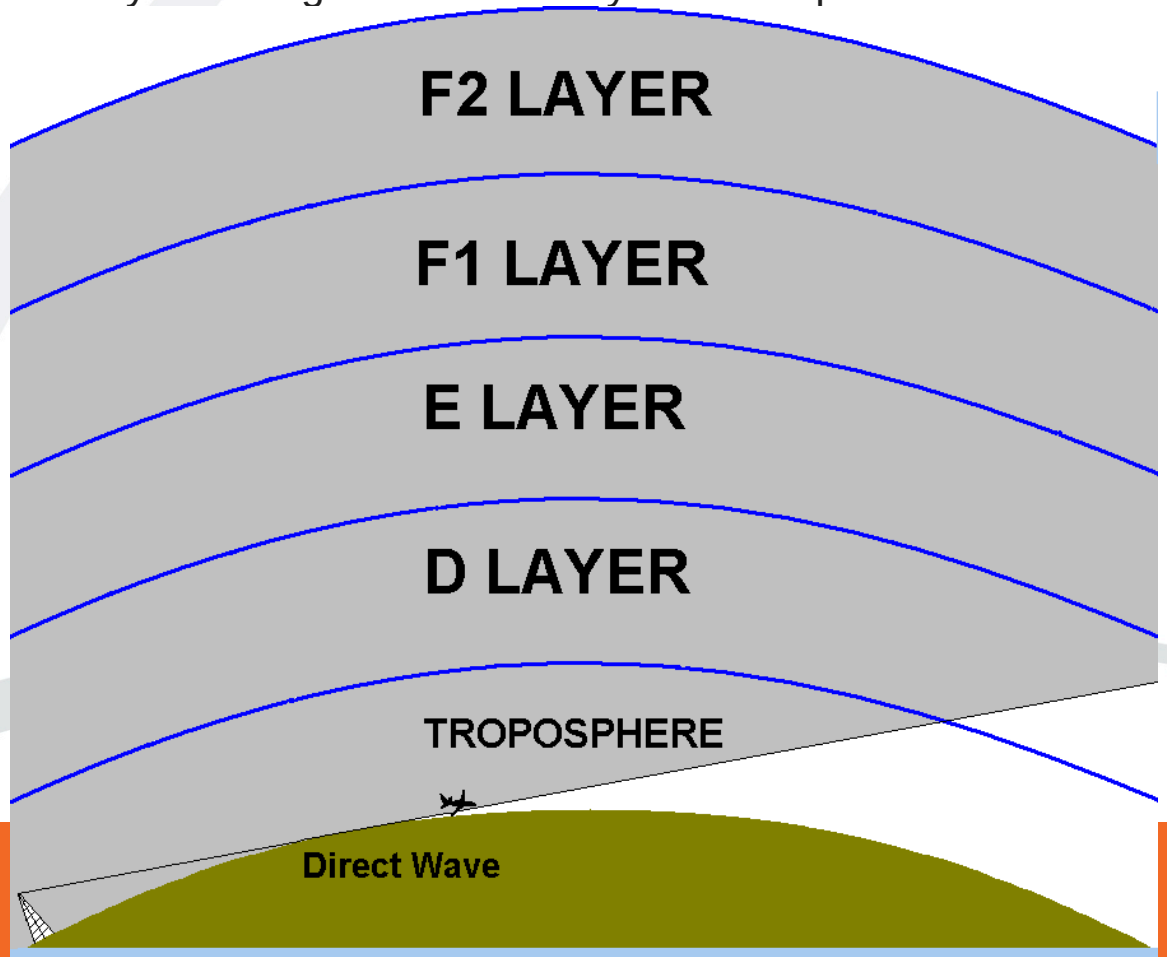
RADIO WAVE PROPAGATION

- Ground waves require a path where both antennas have a clear line of sight to one another with no obstructions. VHF and UHF transmissions use this path. The portion of the radiated energy that is directed above the horizon constitutes *sky waves.* Sky wave communications are dependent on specific ionosphere conditions to provide the signal path between the transmitting and receiving antennas. Sky wave signals are bent by the Ionosphere.



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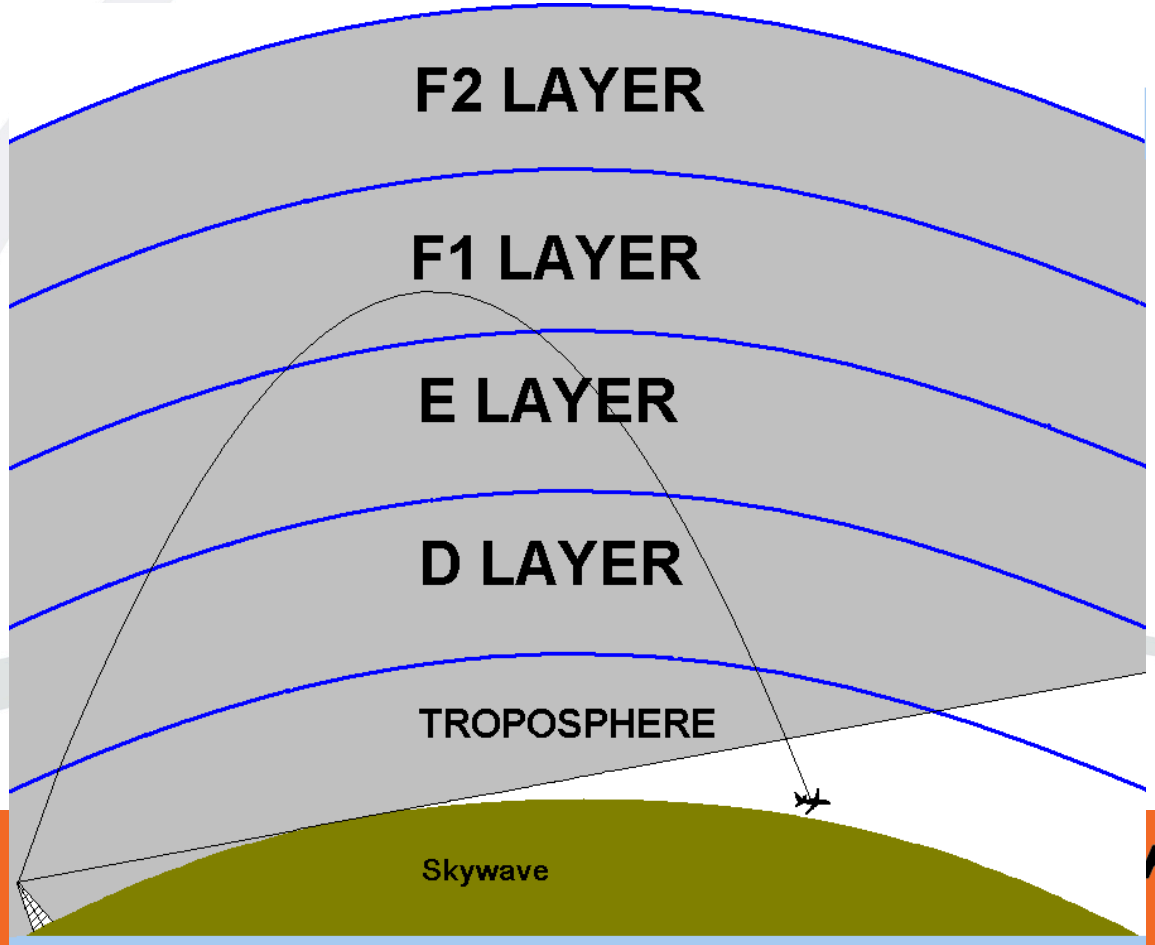
RADIO WAVE PROPAGATION

- The frequency choice is very important, as those above a certain value will not be refracted back to Earth but punch through into space. Conversely, lower frequencies have more static during the day because the signals are being absorbed by the lower layers of the charged Ionosphere.



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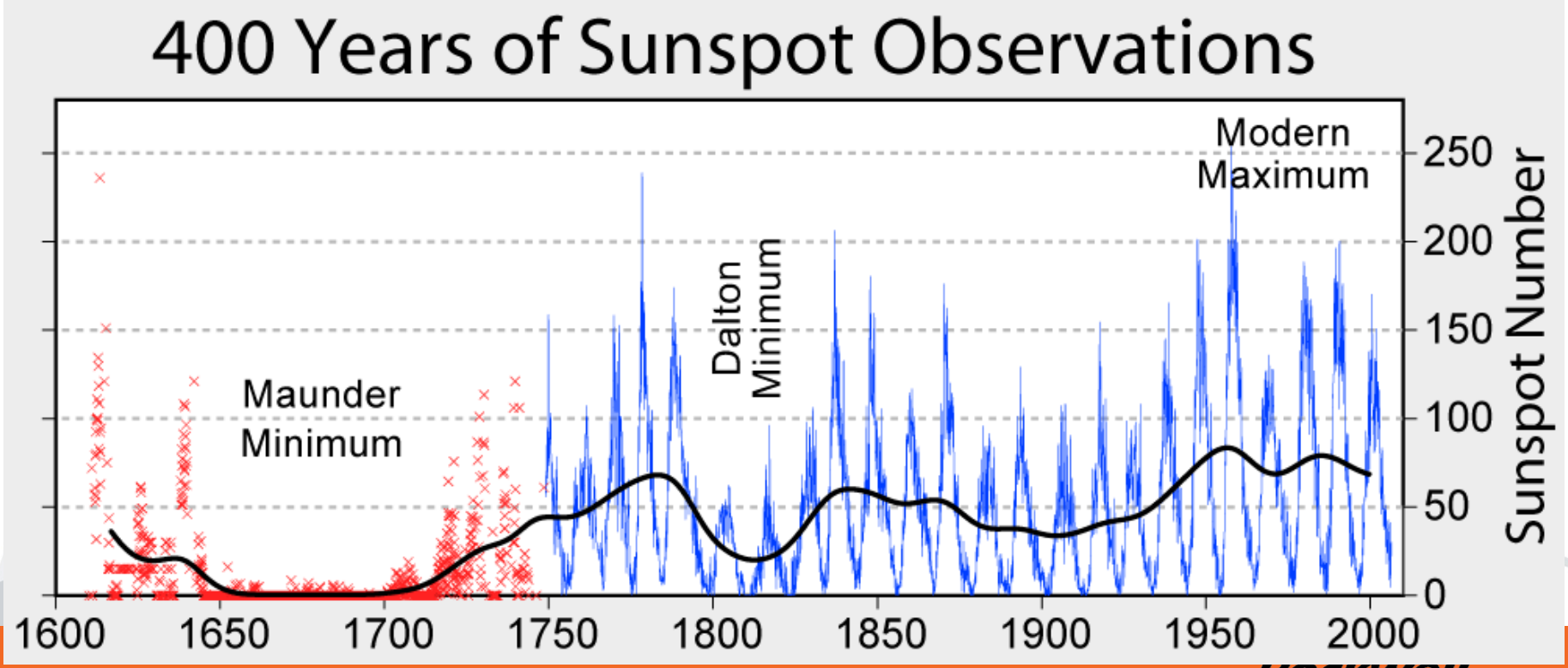
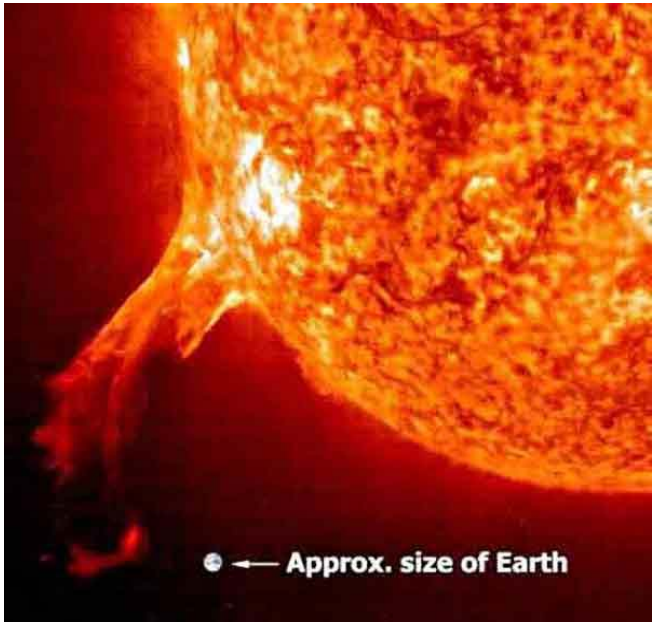
REGULAR VARIATIONS OF THE IONOSPHERE

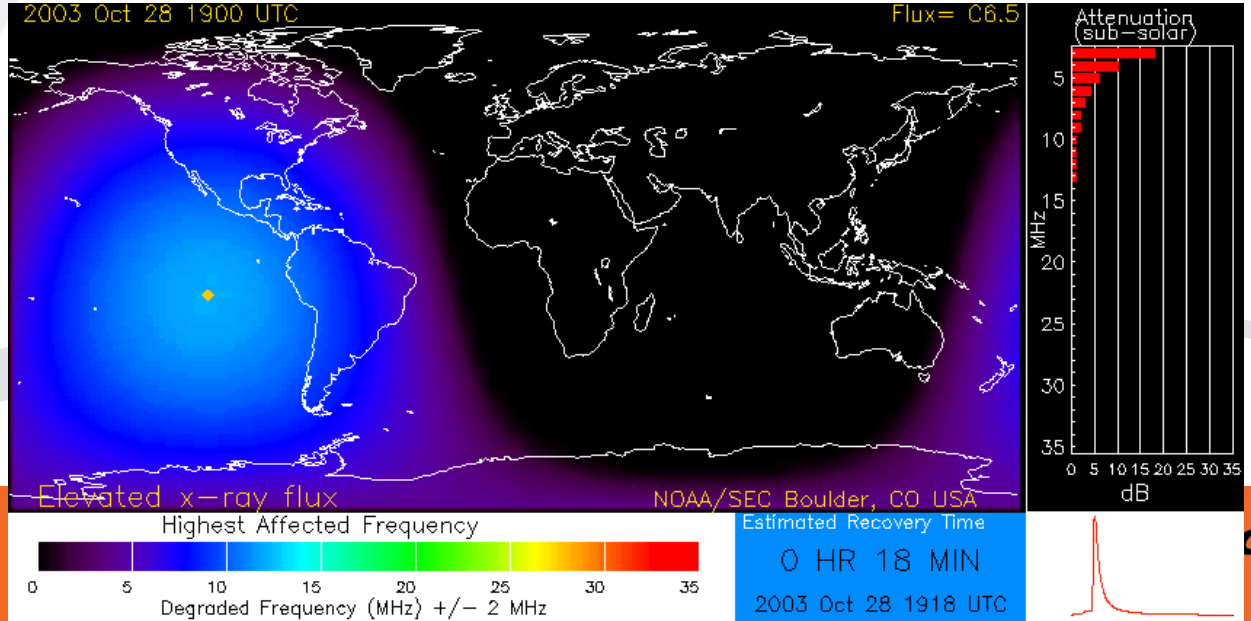
- Space Weather –
- Over the last 400 years, the average number of sunspots has regularly waxed and waned in 11 year cycles. Near the peak of the cycle violent energy releases occur near the sunspots, emitting x-rays, radio bursts and rapidly moving plasma clouds which produce magnetic storms when they reach Earth.



VARIATIONS OF THE IONOSPHERE.

- Some irregularities are:
  - **Solar Flares** – Solar flares create a wide spectrum of radio noise. In HF, and under unusual conditions, VHF, this noise interferes with the intended signals. Radio operators can experience great difficulty in transmitting and receiving radio signals during solar flares.





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HF Voice Fundamentals

- **An ARINC radio operator monitors several different frequencies at one time.**
- Primary & Secondary frequencies for the Oceanic MWARA are determined by radio operators depending on time of day and seasonal propagation as discussed in previous slides.
- Frequency Selections – Keep in mind distance from equipment, as well as the time of day. Remember:
  - Daytime = Higher frequencies
  - Nighttime = Lower frequencies
  - Greater Distance = Higher frequencies

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HF Voice Fundamentals

- The primary mission of the ARINC Radio Communication Centers is to provide communications in U.S. Oceanic Airspace to U.S. FAA Oakland/OAK, Anchorage/ANC, and New York/NYC ARTCCs.

- HF Radios must be in Upper Side-Band/USB mode, not AM.

- Voice Comms Procedures:

- **Helpful Communication Tips for Flight Crew:**

- Always use complete Flight Plan Identification:
- **Example: "SAN FRANCISCO, THIS IS SUNWING FIVE-ONE-EIGHT"**

- - On initial HF call, advise the frequency calling on.

- Example on Caribbean HF Frequency 6577 kHz: **“NEW YORK THIS IS SUNWING SEVEN-ONE-TWO ON SIX FIVE SEVEN SEVEN…OVER”**

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HF Voice Fundamentals

- When giving position reports, use ICAO 4444 message reporting formats and procedures.

Section 1	1	Aircraft identification	*(aircraft identification)*
	2	Position	POSITION *(latitude and longitude)* OVER *(significant point)* ABEAM *(significant point)* *(significant point) (bearing) (distance)*
	3	Time	*(time)*
	4	Flight level or altitude	FLIGHT LEVEL *(number)* or *(number)* METRES *or* FEET CLIMBING TO FLIGHT LEVEL *(number)* or *(number)* METRES *or* FEET DESCENDING TO FLIGHT LEVEL *(number)* or *(number)* METRES *or* FEET
	5	Next position and estimated time over	*(position) (time)*
	6	Ensuing significant point	*(position)* NEXT

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HF Voice Fundamentals

The ARINC HF Radio Operator/RO at idle is guarding 6 or 7 HF frequencies of an "HF Family" or "HF Group" using a split (stereo) headset.

Primary & Secondary HF frequencies for a particular Family or Group are determined by the RO based on HF signal propagation/performance at that time.

The Primary HF frequency will be in the ROs right or "work“ ear. The remaining frequencies, one of which will be the Secondary HF, will be in the left ear.

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HF Voice Fundamentals

- **Listen for Readbacks of Position Reports.**
- The ARINC RO has the option of reading back any report, or report part, for verification by the flight crew. After the readback the ARINC RO will expect the aircraft to verify or correct their readback.

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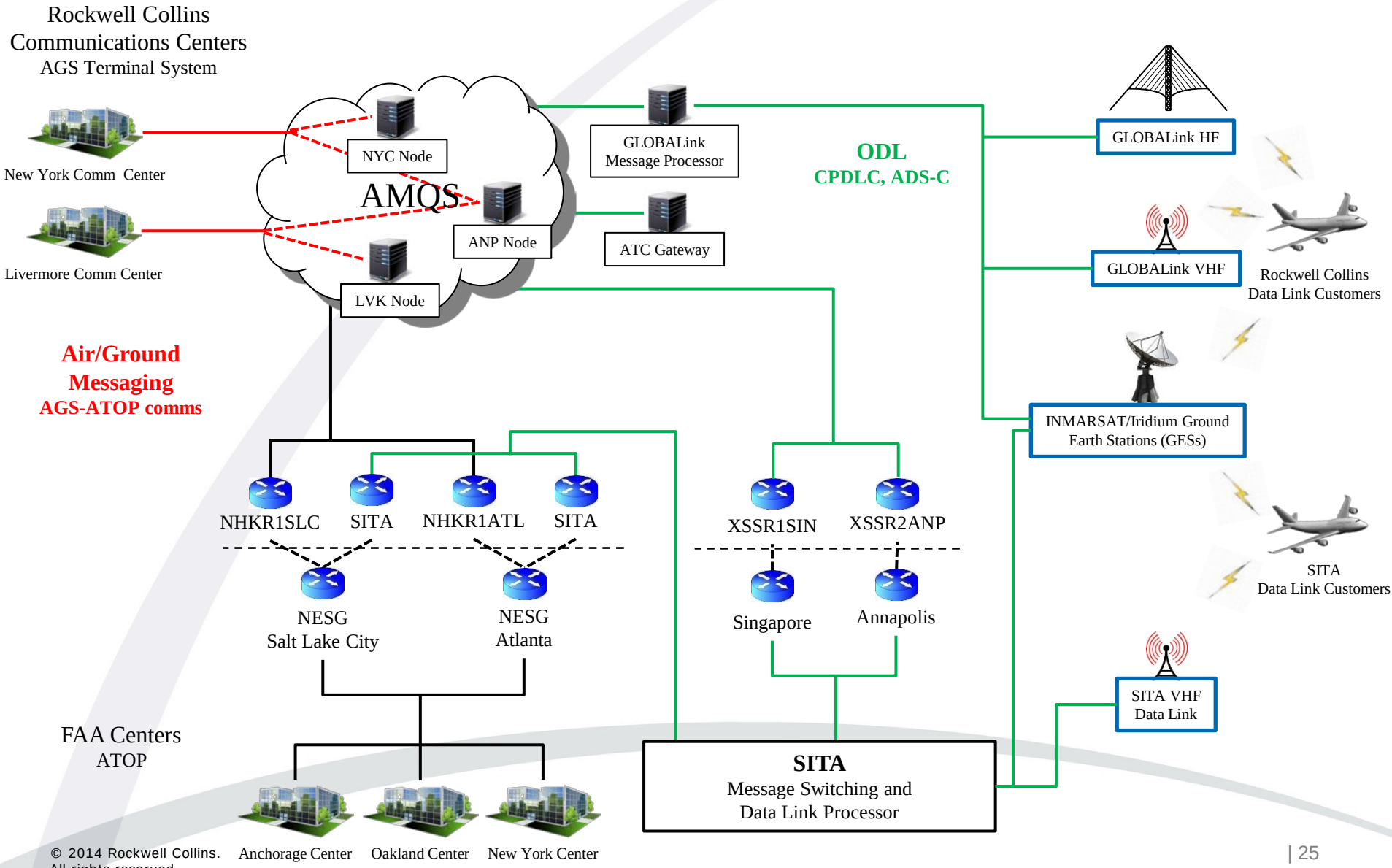
Rockwell Collins-FAA-SITA Connectivity Simplified



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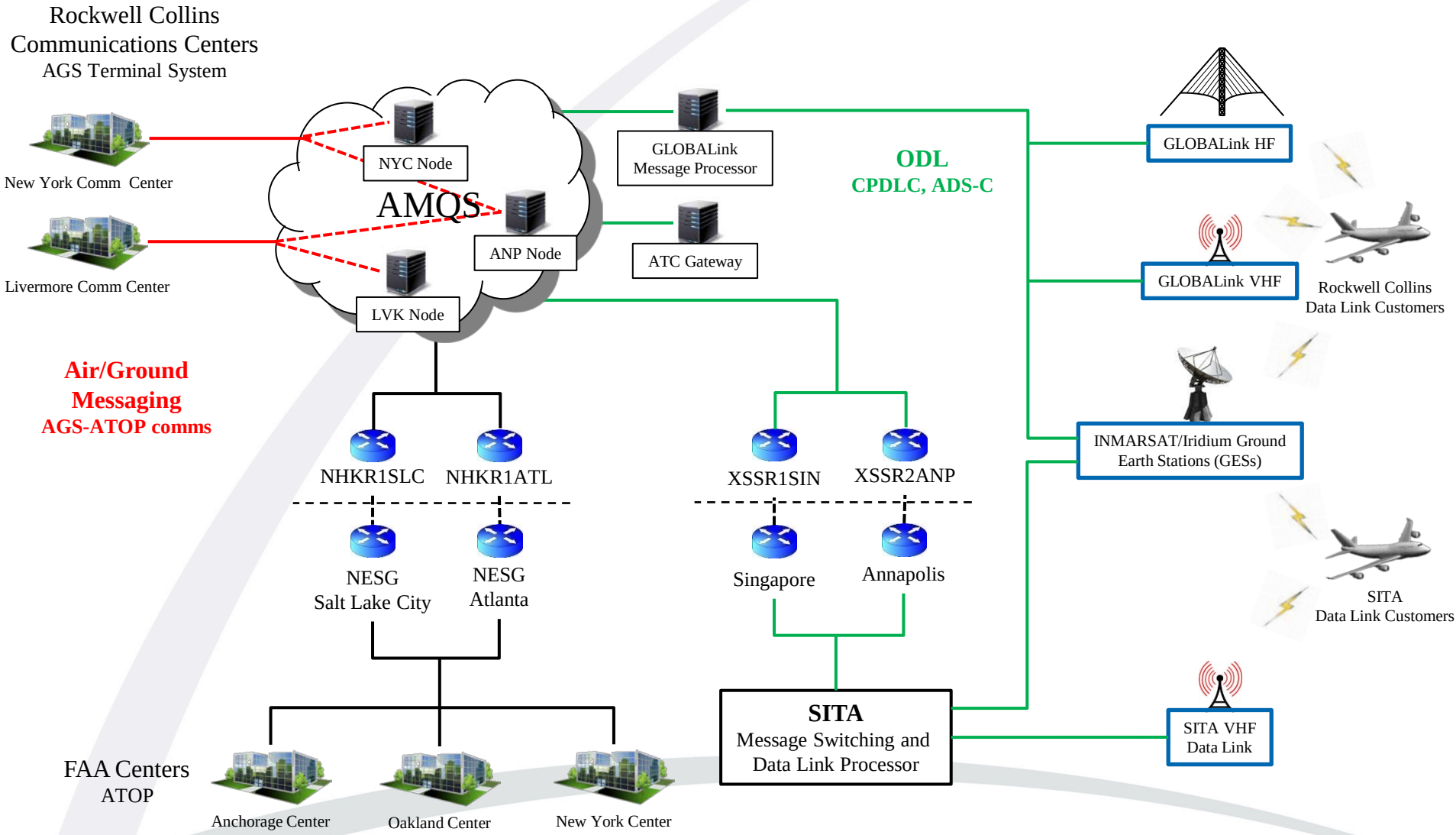
Rockwell Collins-FAA-SITA Connectivity Simplified



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Questions or Comments

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