

Denel Frequency Requirements



Global supplier of world-class defence products and solutions

Typical RF related Requirements

- Telemetry - Overberg & Alkantpan
- Tracking Radar - Overberg, Missile Deployments
- Flight Termination Services - Overberg & Alkantpan
- Command and Status - Missiles and UAV's
- High Speed links (Video/Data) - Missiles and UAV's
- Proximity Fuses - Missiles
- Radar Seekers – Missiles
- Altimeters – Missiles and UAV's
- SAR - UAV's



Overberg

- Telemetry 2.3GHz
- Tracking Radars
- Service delivery to International Clients
- Established 1980's

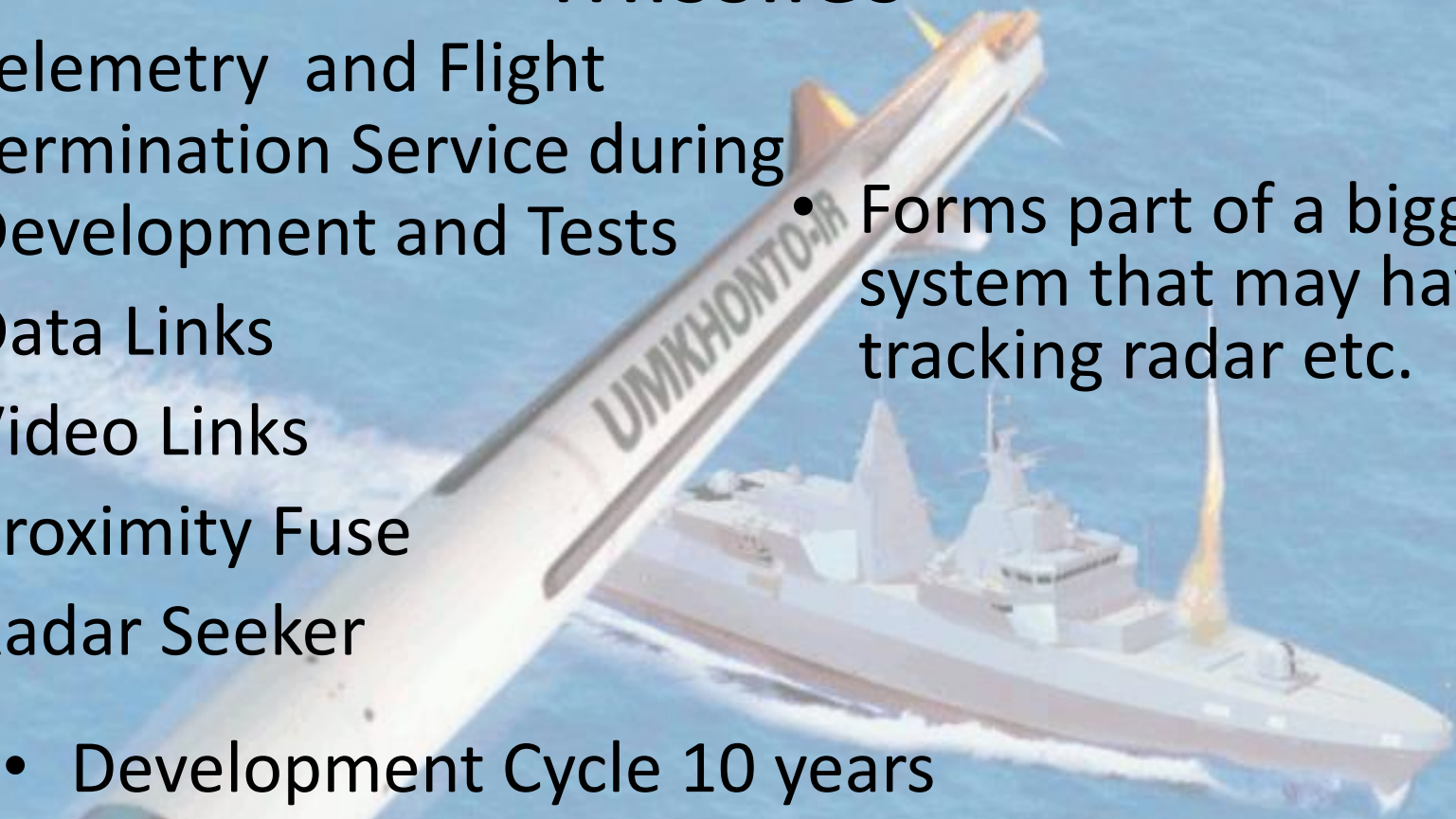


UAV's



- Redundant Video & Data Links
- Redundant Command & Status Links
- SAR
 - Development Cycle: 7 years
 - Radio equipment usually COTS
 - Typically operational several hours
- Air-band Radio
- Transponder
- Tactical Radio
- Radio Altimeter
- Satellite Link

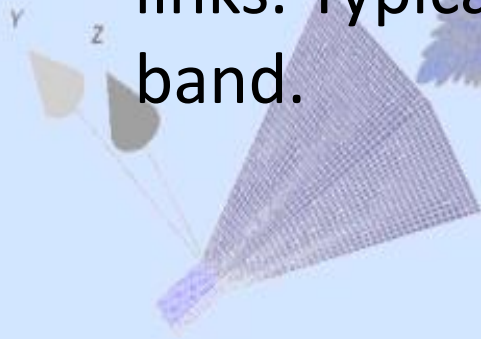
Missiles

- Telemetry and Flight Termination Service during Development and Tests
 - Data Links
 - Video Links
 - Proximity Fuse
 - Radar Seeker
- Forms part of a bigger system that may have tracking radar etc.
 - Development Cycle 10 years
 - Radio equipment is developed as part of Missile
 - Typically operational for a few minutes.
 - Deployment at test ranges and during war time.
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Radiation Pattern

- Due to high dynamic environment of missiles, Omnidirectional antennas is being used for communications links. Typically higher S-band.

- Radars need directional antennas, but due to size need to be in X and K Bands
- UAV's use a combination of Omni and steered antennas

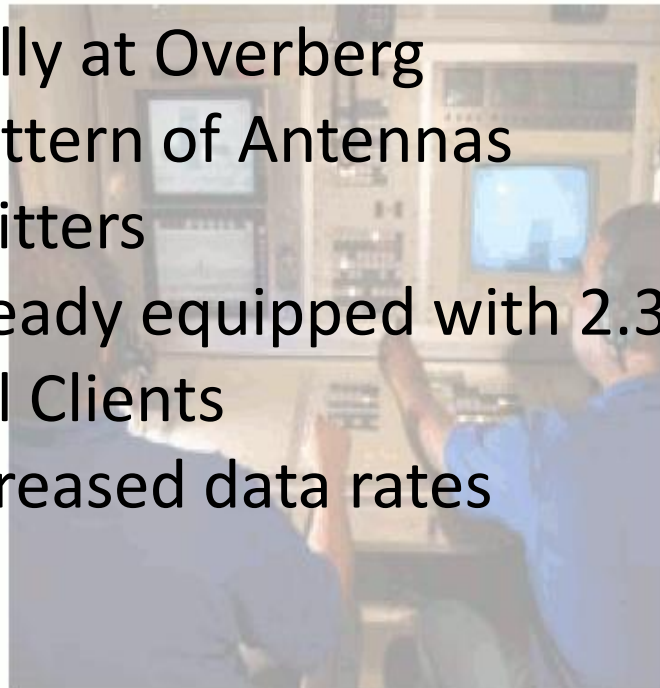
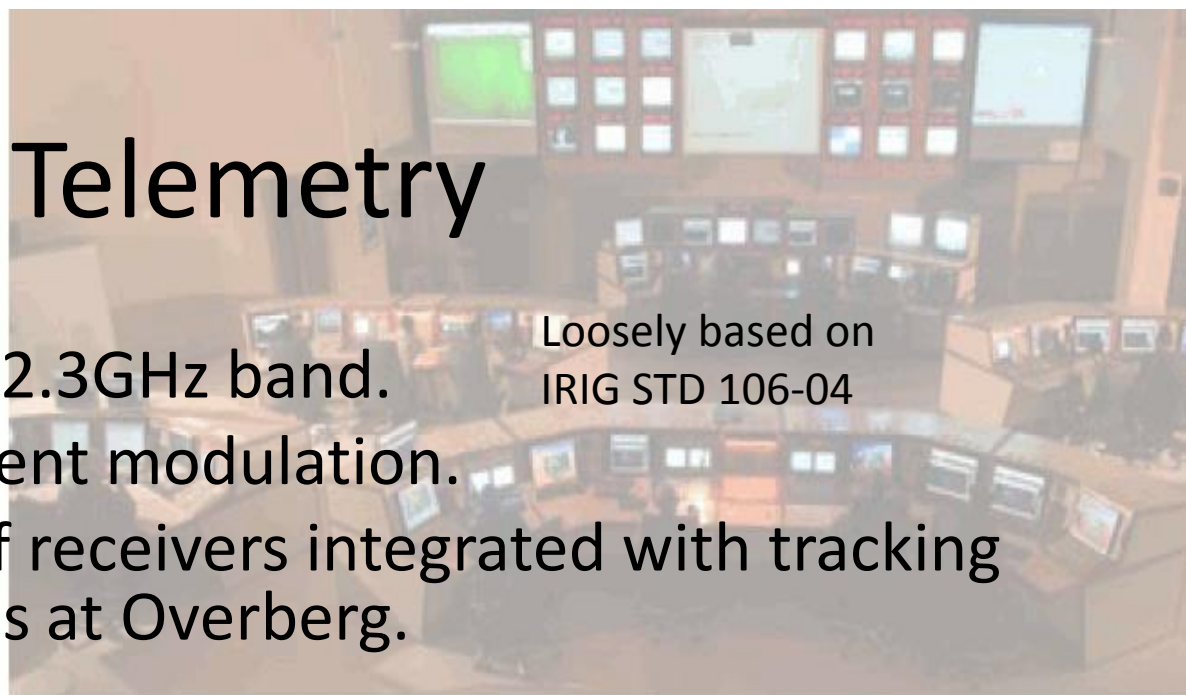
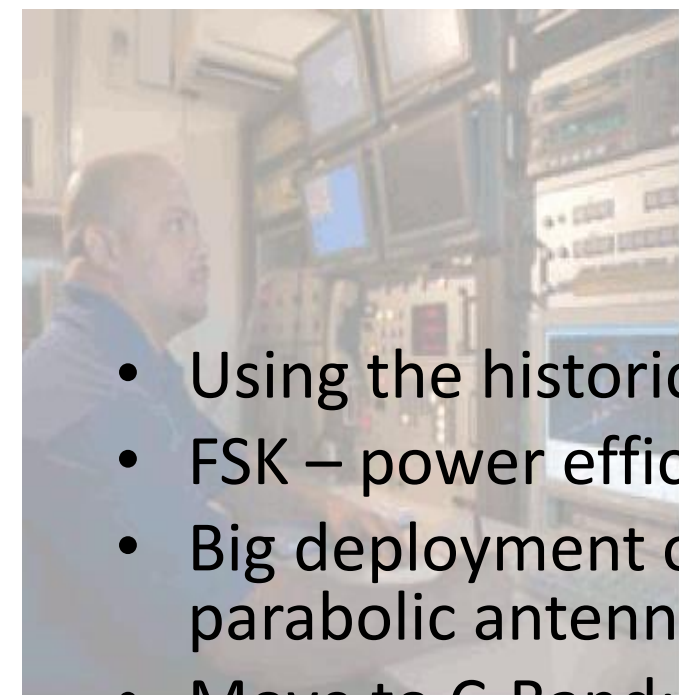


Telemetry

Loosely based on
IRIG STD 106-04

- Using the historic 2.3GHz band.
- FSK – power efficient modulation.
- Big deployment of receivers integrated with tracking parabolic antennas at Overberg.
- Move to C-Band:

- Cost especially at Overberg
- Radiation pattern of Antennas
- New Transmitters
- Products already equipped with 2.3GHz Tx
- International Clients
- Cater for increased data rates



Constraints

- Frequencies are to be treated as secret. – Applying for license essentially void this.
- Power efficient modulation are to be used as power is limited on missiles.
- Product lifecycles are typically 10 to 30 years.
- Antennas and radio's are tightly integrated into the missile system.
- Dynamic operational environment:
 - -40 to 85 °C
 - High Vibration and Acceleration (>20g)
 - High speeds (March 4)
 - Fast start-up times (100's of ms)

Historic Info

- Before 1994 the defence force could utilize any frequency at its discretion and such frequencies were kept secret.
- The Overberg Test Range emerged from a satellite launch facility announced in 1981 and formal qualified in 1991.
- Licensing of Frequencies is typically the responsibility of the client. (except for telemetry)