Iridium Security

Datalink Users Forum

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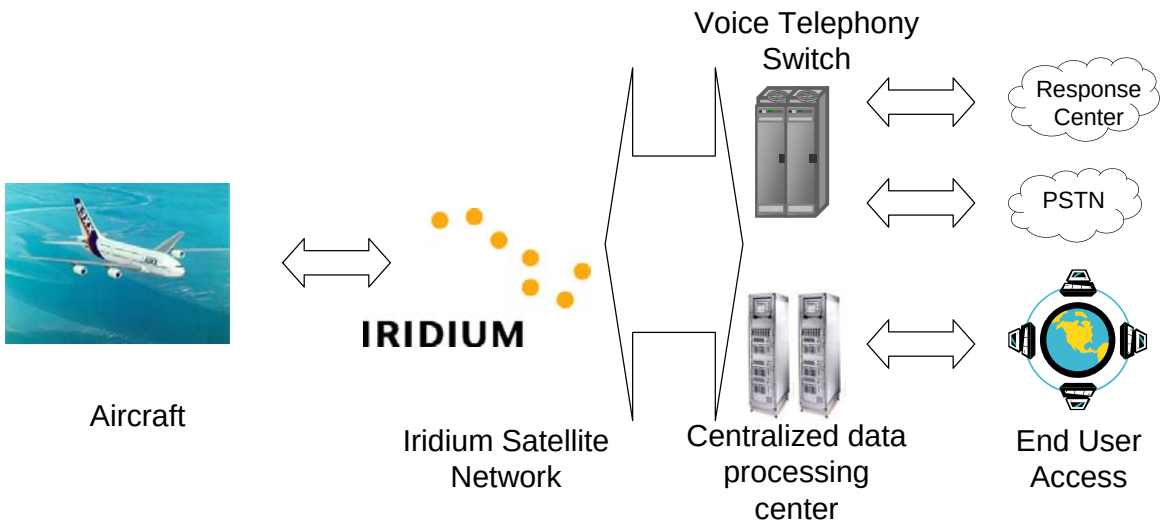
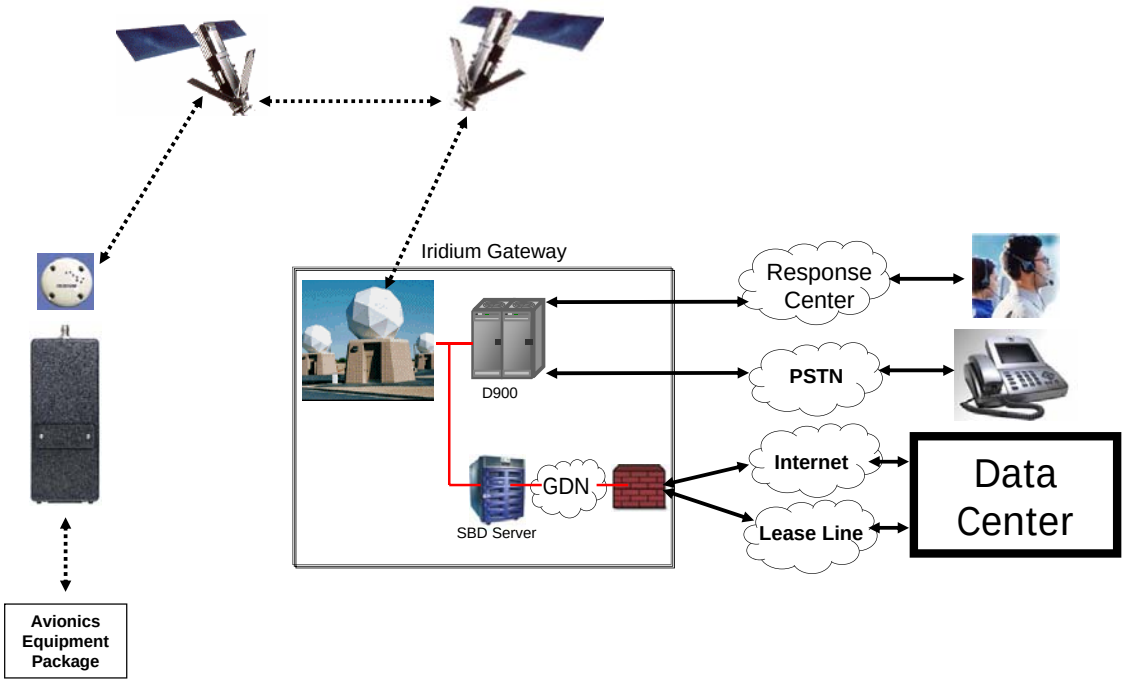
Inherent Network Security

Generic Solution Architecture



Functional Network Architecture



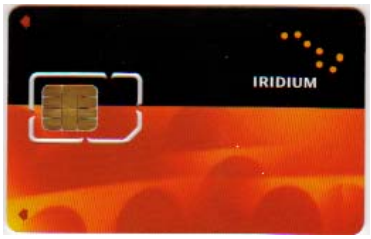
Introduction

The Iridium System supports the GSM-specified algorithm A3 for authentication security.

The table below summarizes the security features explicitly designed into the Iridium system.

Authentication	A3 (128-bit Key)
Equipment Anti-Theft Validation	Global EIR
Anonymity (User location confidentiality)	TMSI based
Signaling Message Confidentiality	Not Available
Voice Privacy	Not Available
User Fax/Data Confidentiality	Not Available
User Verification	SIM-based PIN

Authentication



- The Iridium System supports the GSM-specified algorithm A3 for authentication security in SIM based subscriber equipment
- The Iridium authentication process is adapted without change directly from the GSM specifications.
- The GSM algorithm A3 is used to encrypt authentication information transmitted over the air interface.
  - Authentication encryption
  - Designed to prevent ISU cloning fraud
  - GSM encryption algorithm A3 is executed on SIM card to generate Signed Result (SRES) response based on the following inputs
    - Secret Ki parameter stored in SIM card
    - RAND parameter supplied by network

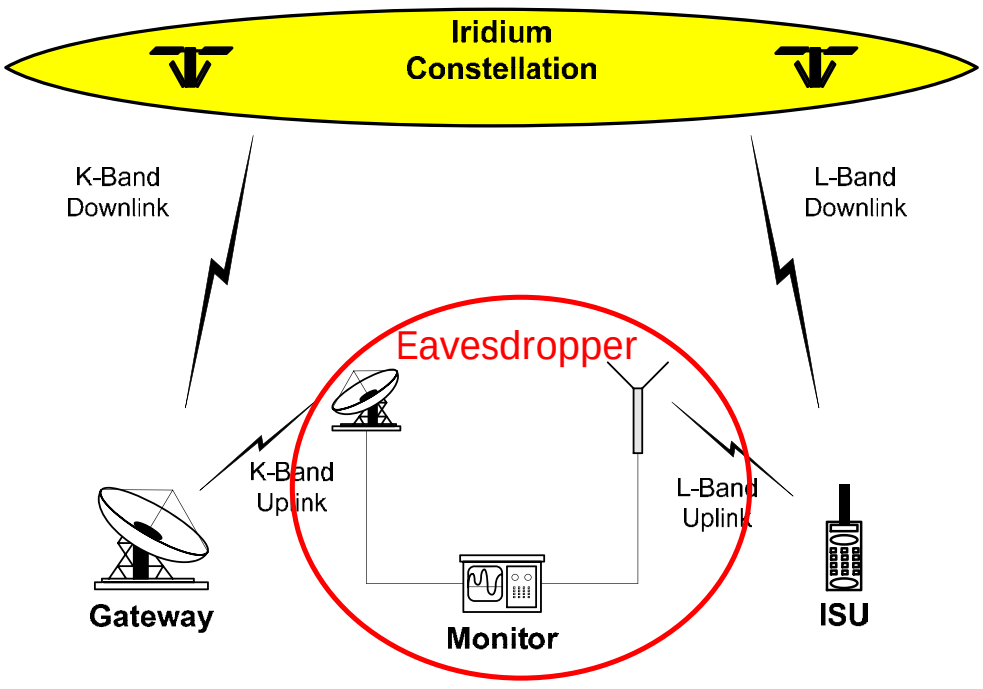
Hardware/Equipment Validation

- EIR - Equipment Identity Register
  - Simply a “white list” and “black list”
- The EIR is a database
- When a ISU requests services from the network its IMEI (International Mobile Equipment Identity) is checked against the EIR to assess which category it falls into.
- Black-listed ISUs are not allowed to access the network:
  - Those reported stolen or
  - Whose operation on the network will adversely affect the network
- White-listed ISUs are those that are permitted to access the network.

Iridium Channel Security

- Iridium voice, data, and signaling channels are afforded some security by the limited distribution of the air interface and feederlink interface specifications.
- The Iridium Air Interface Specification is made available only to Iridium Subscriber Unit (ISU) manufacturers.
  - Iridium Satellite LLC is the sole ISU manufacturer
- Feederlink interface specifications are not distributed outside of Motorola.
- Opportunities for surreptitious monitoring of Iridium bearer channels exist. An eavesdropper could, in principle, monitor:
  - L-Band Channels
    - Uplink, from ISU to Space Vehicle (SV)
    - Downlink, from SV to ISU
  - K-Band Channels
  - Uplink, from gateway to Space Vehicle (SV)
  - Downlink, from SV to gateway

Iridium Link Monitoring Opportunities



L-Band Channel Security

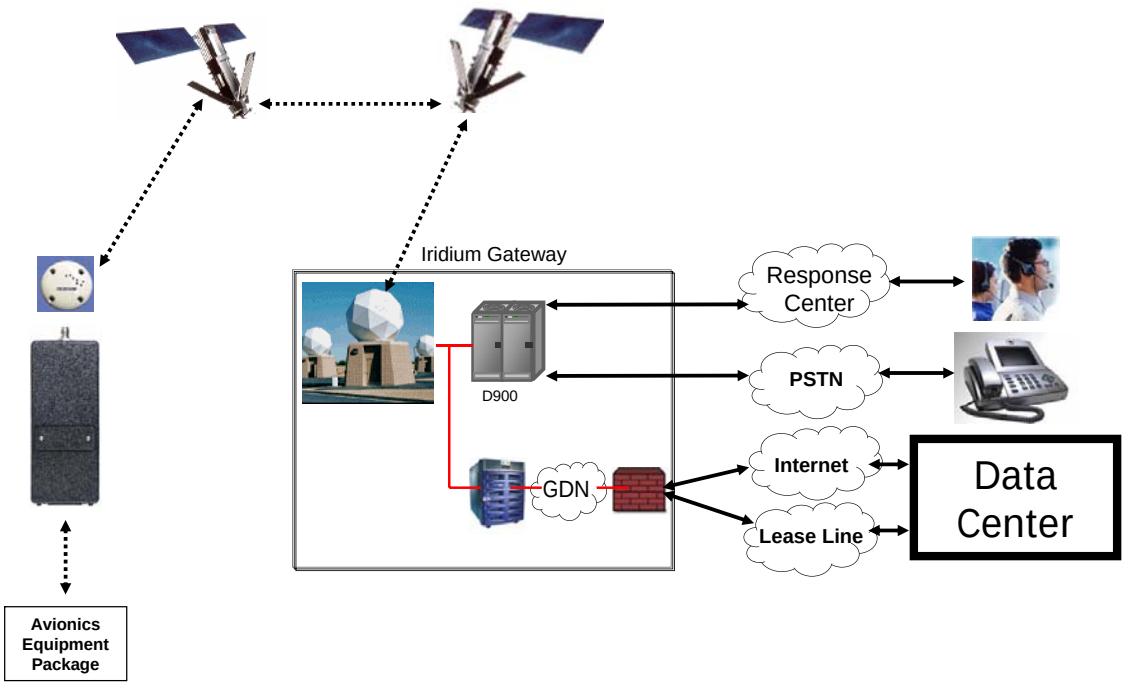
- To monitor an L-band channel,
  - Located within the transmit range of the ISU being monitored (10 to 30 km)
  - ISU downlink L-Band transmissions could be received over a much wider area but within the coverage area of a common beam
- The complexity of the Iridium air interface makes the challenge of developing an Iridium L-Band monitoring device very difficult and probably beyond the reach of all but the most determined adversaries.
- Among the complications are
  - Large, continually changing Doppler shifts
  - Frequent inter-beam and inter-SV handoffs
  - Time-division multiplexed burst mode channels
  - Complicated modulation, interleaving and coding

K-Band Channel Security

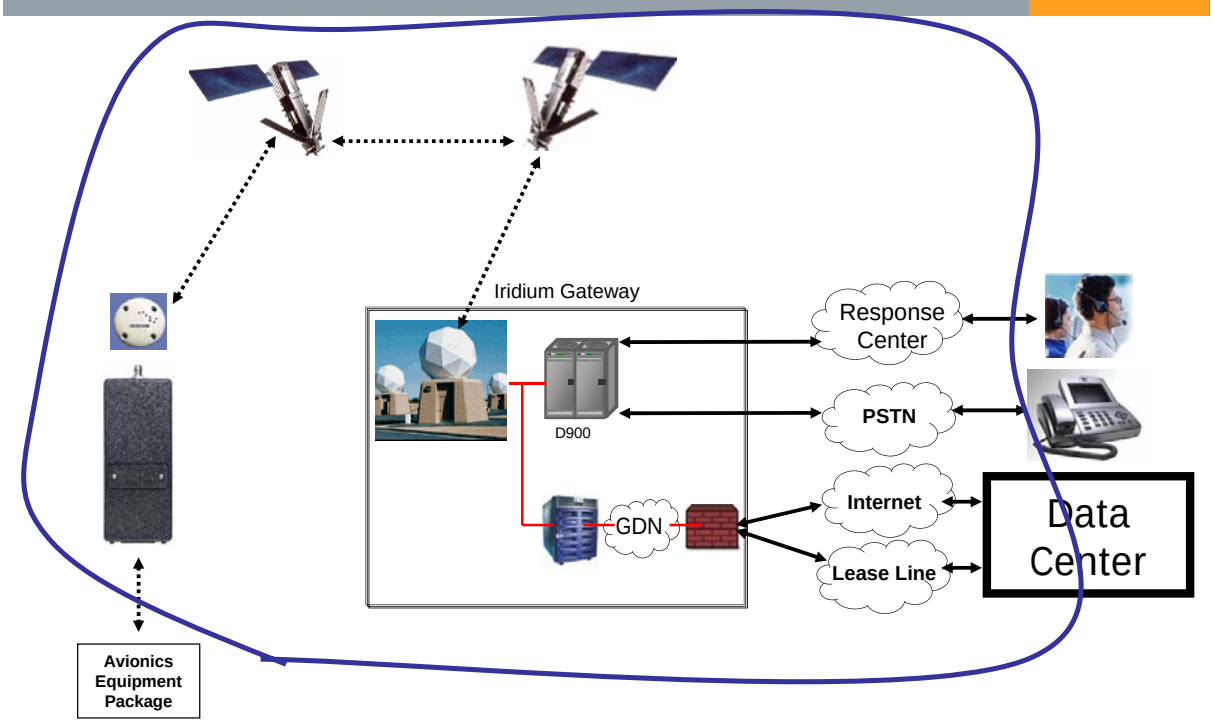
- To monitor a K-band feederlink channel
  - Sophisticated monitoring device located in the general proximity of an Iridium gateway.
  - High-gain antenna capable of tracking SVs as they move from horizon to horizon.
- Complexity of feederlink interface poses a formidable technical challenge for prospective eavesdroppers.
- Cost of the monitoring device alone would be a strong deterrent.
- Among the technical complications are
  - Large, continually changing Doppler shifts
  - High capacity, 3.072 Mbps channels
  - High-gain tracking antenna required
  - Must reacquire new SV every 10 minutes

Solution Security

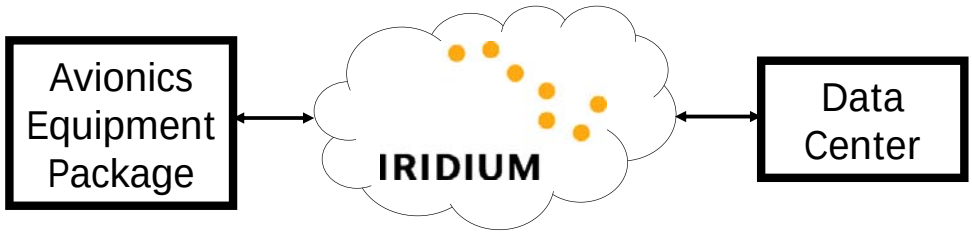
Functional Network Architecture



Functional Network Architecture



Solution Security



- Iridium is the “pipe”
- End to end security/authentication is required in the application
- Consideration should be given by the application designer how applications residing on aircraft or at data centers validate received/sent messages
- Connectivity to/from Iridium is available via VPN and/or leased line

Questions?

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