NAL RESEARCH

Innovative / Military-Grade / Global
SATCOM & Assured-PNT Solutions

Global SATCOM Capability Update for DBCP-38 S&T Workshop

Nov 1st, 2022

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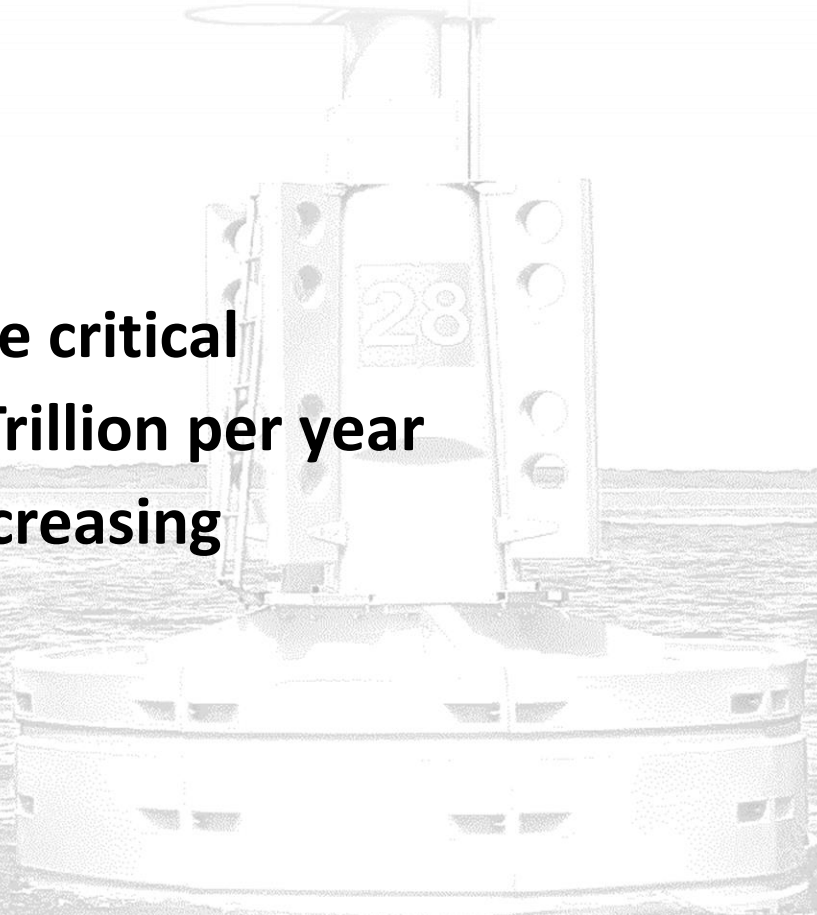
Senior Vice President

Agenda

- ❑ Our Essential Maritime Environments
- ❑ Iridium Next Generation Capabilities
- ❑ NAL Research's Deep Iridium Capabilities
- ❑ Next Generation Quicksilver Midband Modem
- ❑ Airtime Management

Maritime Environment
Essential – Critical – Global

- ❑ **Oceans, seas, and coastal regions are critical**
- ❑ **“Blue economy” estimated at $3-6 Trillion per year**
- ❑ **Maritime environmental stress is increasing**
  - Climate change
  - High paced economic development
  - Pollution
  - Overfishing
- ❑ **Continuous & sophisticated monitoring essential for understanding and adaptation**
- ❑ **Recent updates to Iridium’s constellation enables new solutions**



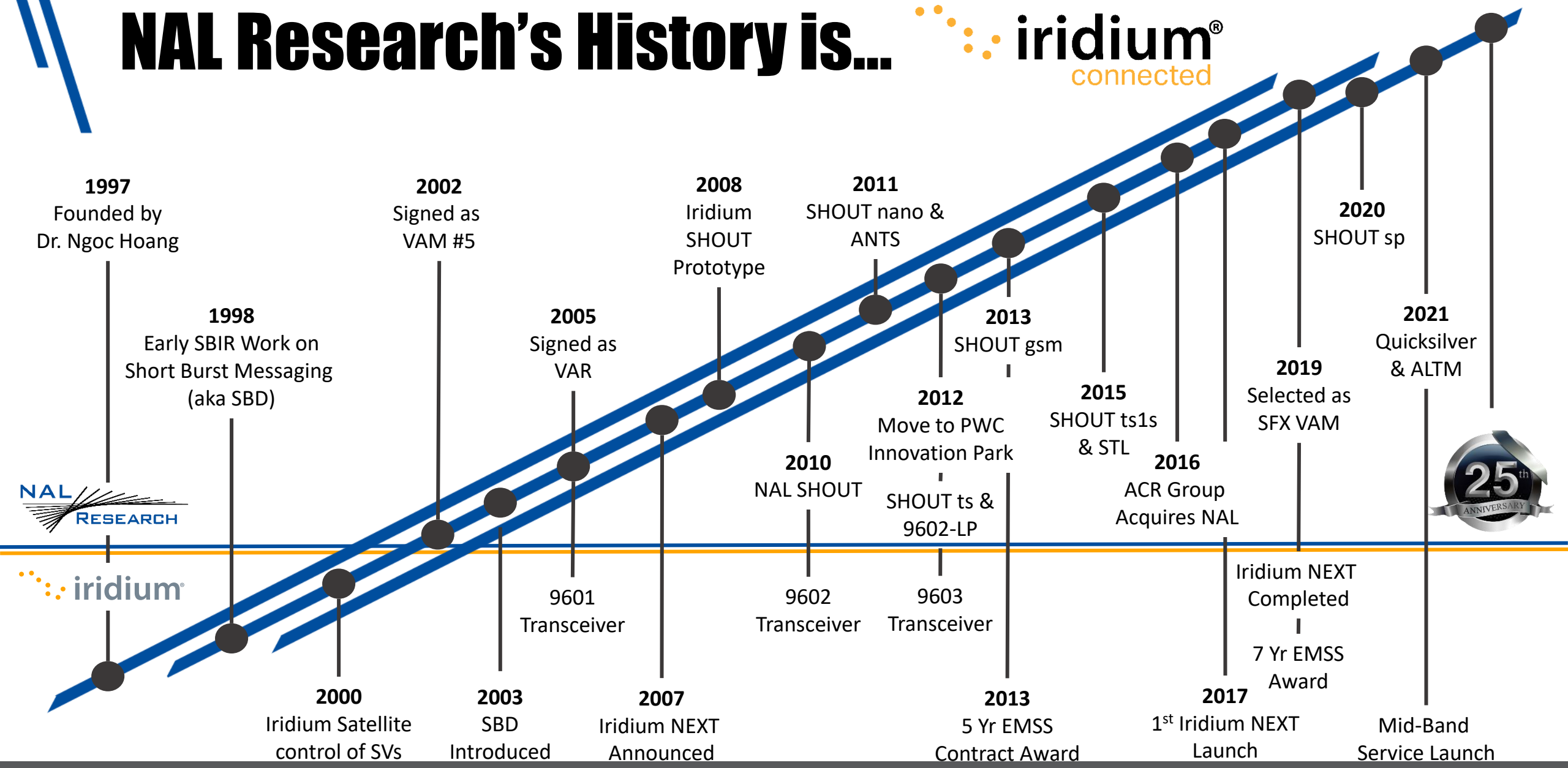
Iridium Satellite Network

- **Fully refreshed in 2019 – Block II**

- **Maintained Capabilities**
  - Global Availability, All-Weather Capacity, Reliability, Low-Latency
  - Narrowband Services – SBD, RUDICS, Voice, Push-to-Talk (PTT)

- **New "Certus" Service Capabilities**
  - More throughput:
    - Midband: 22 – 88 kbps
    - Broadband: 175 – 700 kbps
  - Modern data interfaces

NAL Research's History is...



QUICKSILVER®

Certus Midband Solution

- *NEXT Generation Iridium Certus Midband*
- *Compact, rugged design*
- *Suitable for global OTH & BLOS*
- *Designed for multiple applications*

10-35X Greater Throughput
Compared to Narrowband (2.4 kbps)

"Best-In-Class" *power usage in idle, standby, receive & transmit modes.*

On average, **< 45%** *the size and volume of its competitors.*

IP-Based Interfaces :

Ethernet & Wi-Fi (Optional)

Easy setup / Install Kit:

5min. Out-of-box to on-air

Improved Throughput:

22kbps Uplink/88kbps Downlink

Power Consumption:

Input:	10 – 32 VDC (18 W or Higher Power Supply Recommended)
Typical Performance (@ 12 VDC):	Idle: 2.0 W
	Full-rate RX: 5.5 W
	Full-rate TX: 4.8 - 9.6 W (Satellite Position Dependent)

Antenna Options:

STUB: SAF9700

MAST-MOUNT: SAF9701

PUCK: SAF9702/3

AVIATION: SAF9704

How to Leverage Iridium Certus

- **Multiple Integration Routes**
  - A3LA “Drop-in” Replacement
    - RS-232 interface aligns with common electrical data interfaces
    - AT-Command interface enables rapid swap with existing Iridium architectures
  - Modern Integration Concepts
    - Ethernet electrical interface
    - JSON data interface for remote control

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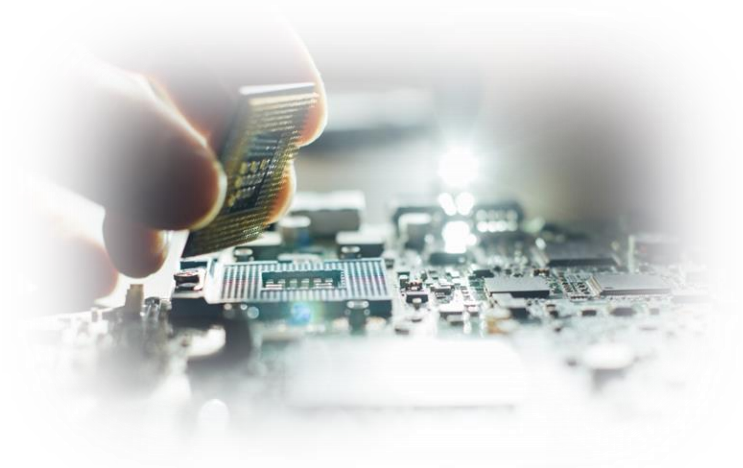
- **Customization and Integration Consulting**
  - Leverage NAL’s deep well of Iridium expertise
  - Boardstack integration
  - Adapted mechanical / electrical interfaces



Example of Success: *A3LA -> Quicksilver Retrofit*

- **Need:** Increased data throughput from 2.4 kbps RUDICS to Certus 100 Service

- **Problem:**
  - Data pre-processed on-board and post-processed data transferred via Iridium RUDICS
  - Ability to transmit raw data for richer processing is desired

- **Solution:**
  - Quicksilver as planned product improvement is direct upgrade for NAL A3LA
  - Quicksilver backwards compatible AT-Command interface enables simple retrofit

- **Result:**
  - Quicksilver system allows for more data to be transmitted quickly via Certus
  - Organizations can process and distribute data for analysis

A3LA

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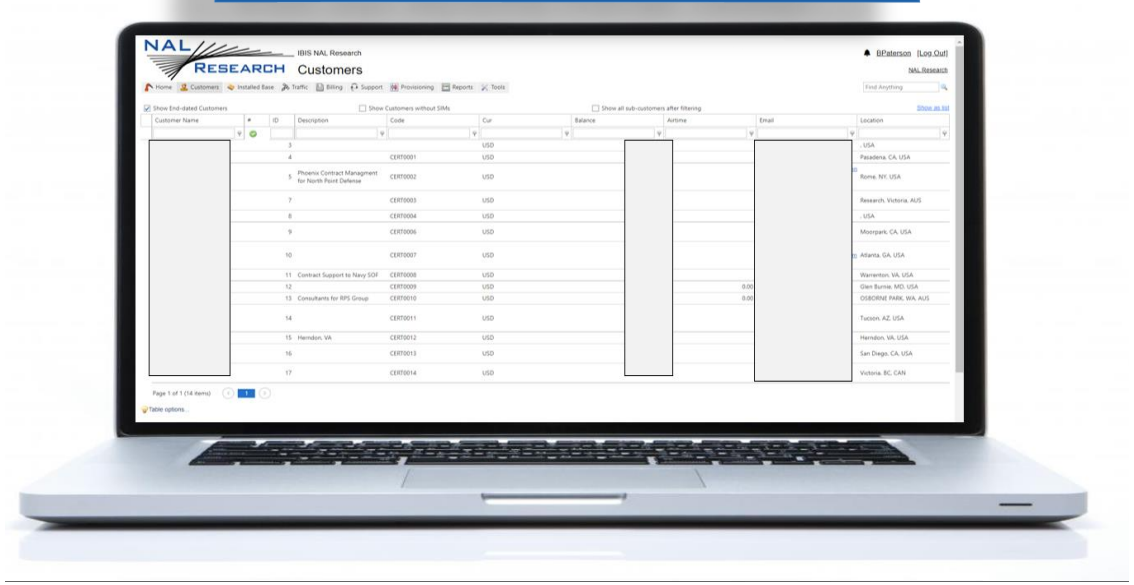
Certus Midband Airtime

- ❑ **Low-cost monthly service plans that work anywhere on the planet**
- ❑ **Customer Portal for Airtime self-management**
  - Data usage monitoring
  - Automated alerts and reporting
  - Ability to modify airtime plans directly

Monthly service & annual plans available

Visit our Airtime Portal Today!



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