

Advanced Coding for Complex Sensor Systems

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Army-Contract MOIE

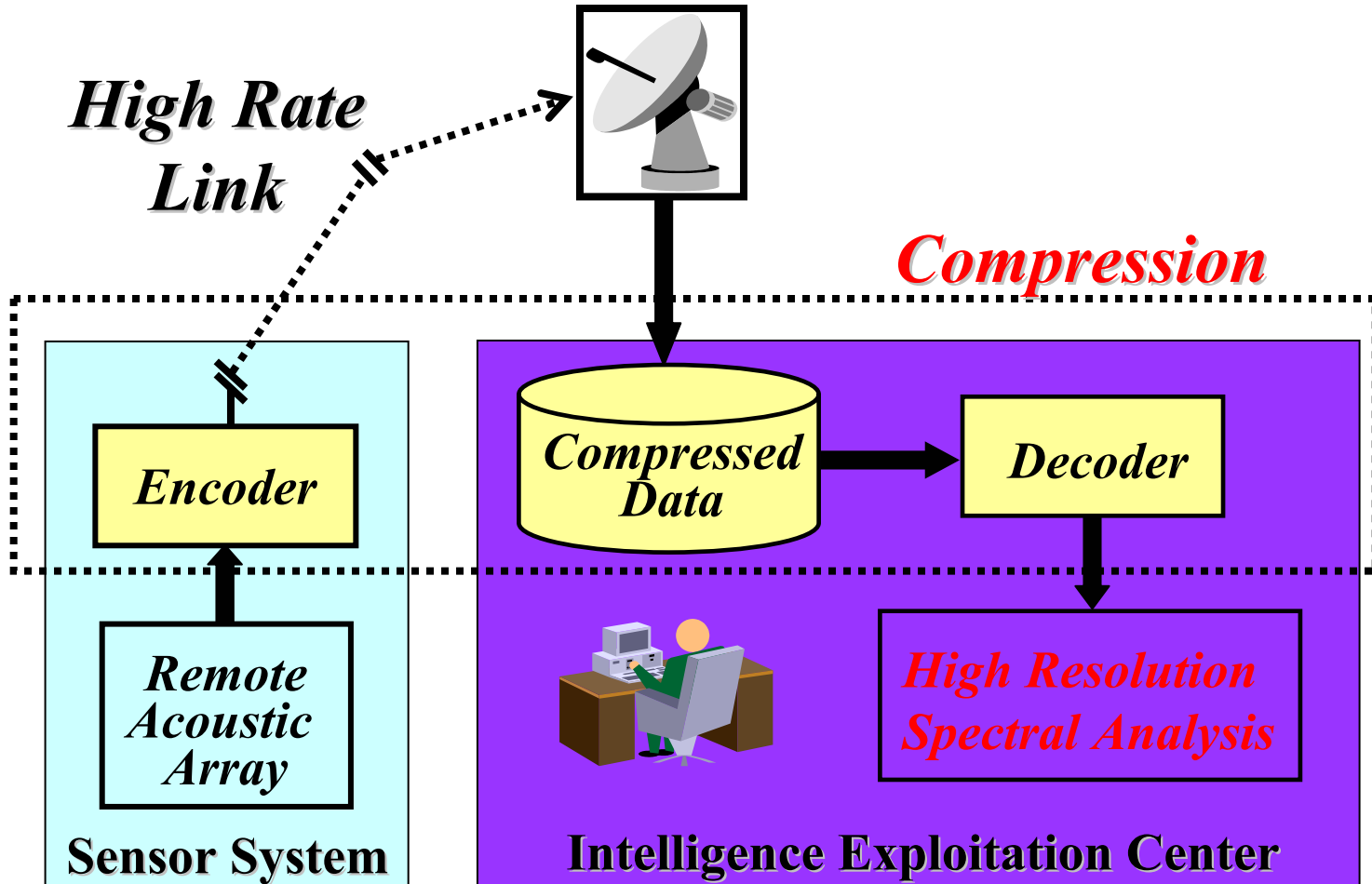
The logo for the MITRE Technology Program, featuring a stylized graphic of stacked blocks in yellow, orange, and blue to the left of the text.

MITRE
Technology
Program

Problem

- **Acoustic intelligence collection and exploitation are hampered by:**
 - **Slow/limited delivery of acoustic data from the field, storage constraints and**
 - **Low-resolution spectral analysis.**
- **Can commercial coding technologies:**
 - **Compress acoustic data, allowing faster transmission, less storage?**
 - **Provide high-resolution spectral analysis?**

Background



Objective

- **Compression: apply audio and image coding standards to sonar data**
 - Process sponsors' representative data
 - Perform objective and subjective tests
 - Transition software tools
- **Spectral analysis: adapt audio coding multirate filter banks**
 - Demonstrate improved spectral resolution for ACINT
 - Transition software to sponsors

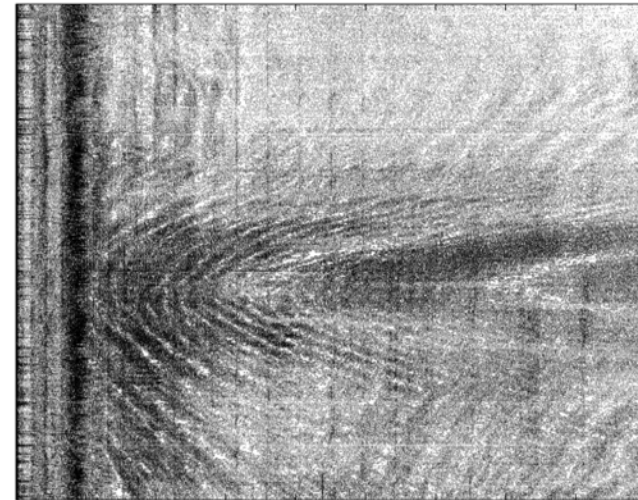
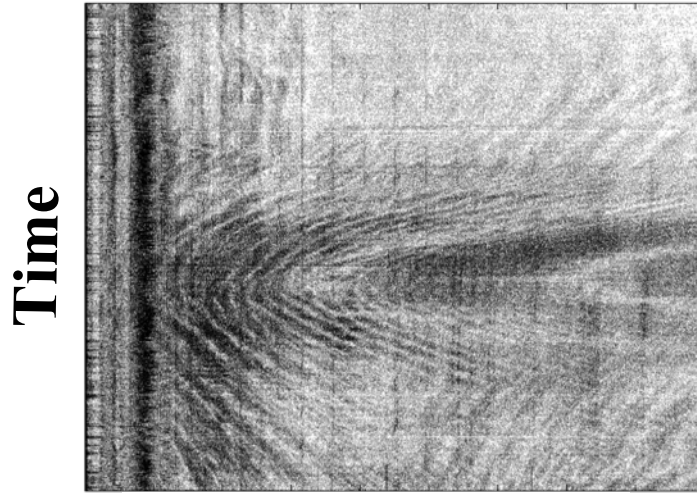
Activities

- **Transitioned lossless compression software to ONI:**
 - Compresses beam data ~ 3:1
 - Prototype under evaluation
- **Demonstrated lossy compression:**
 - Issues noted by ONI analysts have led to additional compression methods
 - Formal analyst tests planned
- **Installed MITRE's spectral analysis software at ONI**

Highlight: Compression

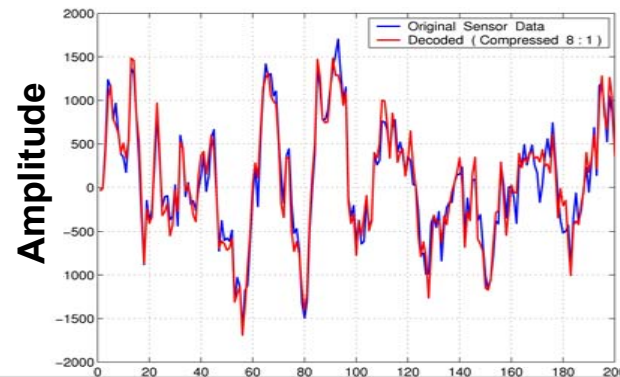
Original

Decoded 8:1



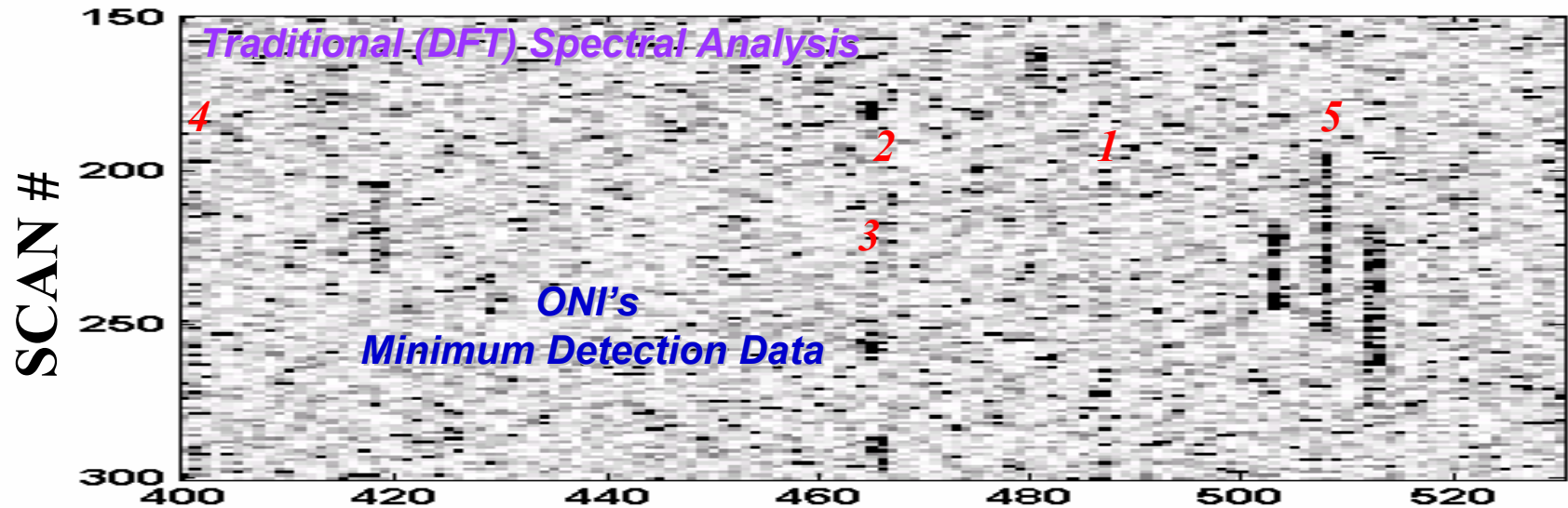
Frequency

Frequency



Original (blue)
Decoded 8:1 (red)

Highlight: Spectral Analysis



SNR dB

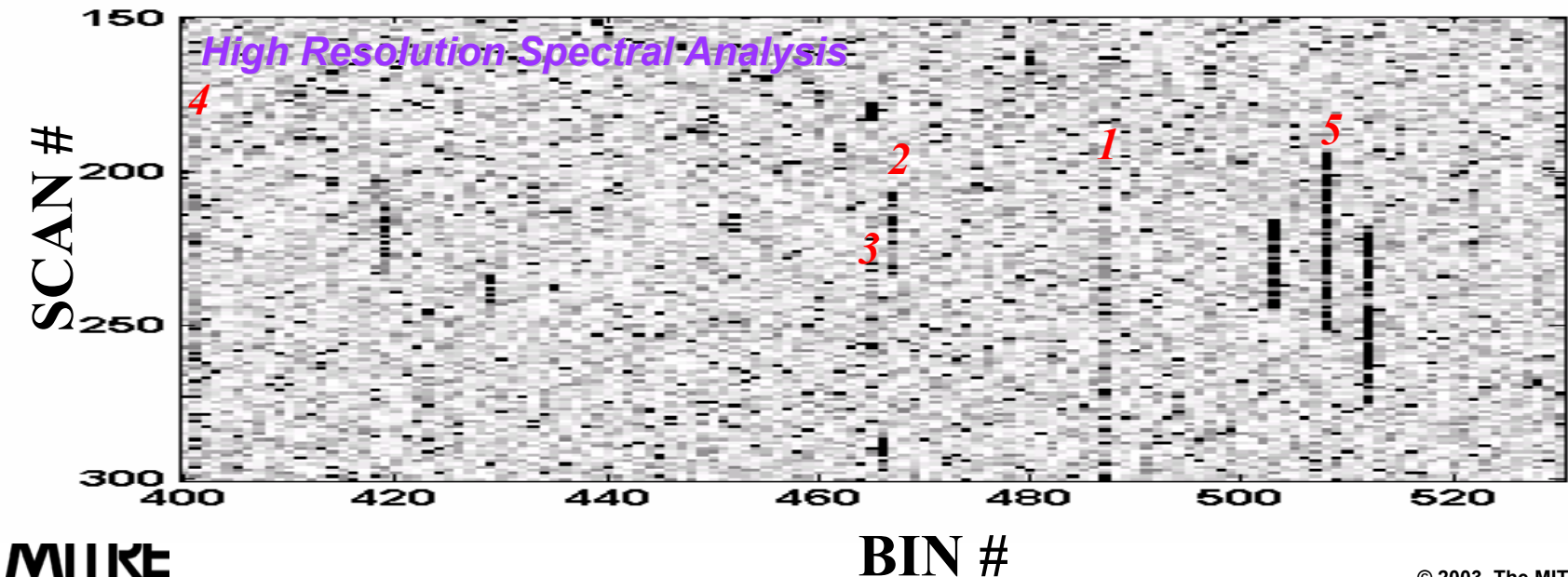
1. -9

2. -7

3. -7

4. -11

5. -3



Impacts

■ ONI:

- Two software tools--lossless compression & multirate spectral analysis--provided to ACINT division
- Close collaboration between analysts & MITRE

■ USGC: MITRE analyzed data & delivered report

■ NAVAIR: MITRE analyzed data, gave presentation & delivered white paper

■ Paper in peer-reviewed journal (1/03), two conference papers (3/03), & patent pending

Future Plans

Apply formal test methods to subjective evaluation of compressed data.

