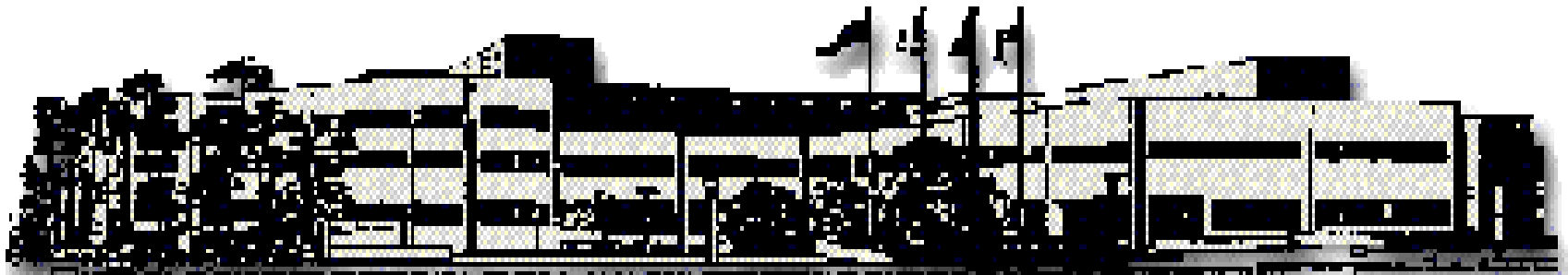# Federal Aviation Administration (FAA)

CHANG MAI - ATN SEMINAR

FAA CPDLC I/ATN LESSONS LEANRED

December 2001

Federal Aviation Administration (FAA) William J. Hughes Technical Center (WJHTC)

Vic Patel, FAA/ACT-550
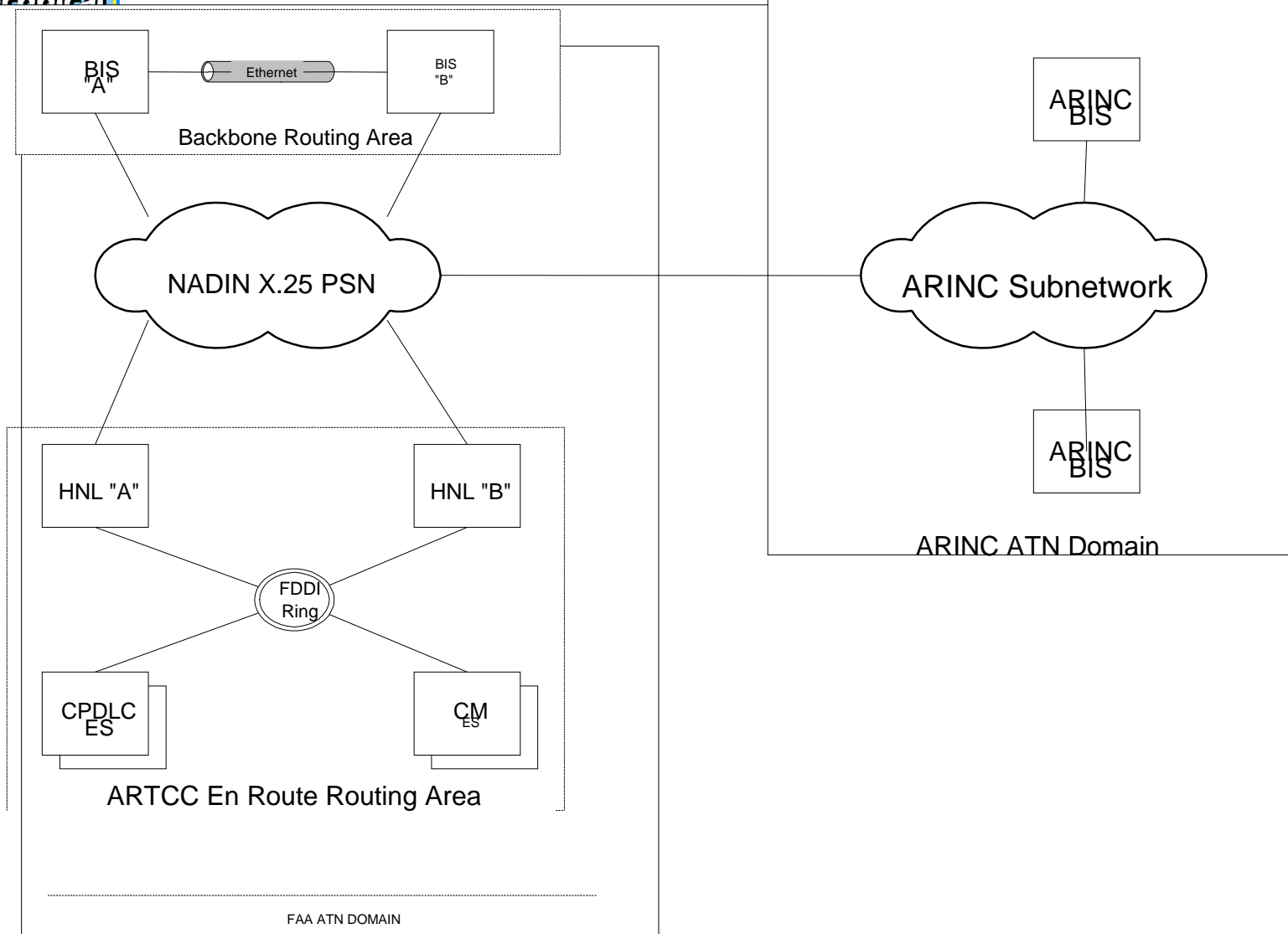
ISSP Manager/ATN Technical Lead

Purpose and Scope

The ATN Infrastructure Test activity has two primary objectives:

1. Ensure that the FAA ATN Boundary Intermediate System (BIS) Router being used in Miami satisfies the requirements specified in the "Proposed FAA ATN Router Capabilities and Features document for CPDLC Build I.

2. Demonstrate that the FAA ATN BIS and the other CPDLC-I ATN components can successfully interoperate in order to deliver digital information between the En Route Air Traffic Controllers and the Airline Pilots for Air Traffic Control (ATC) purposes.
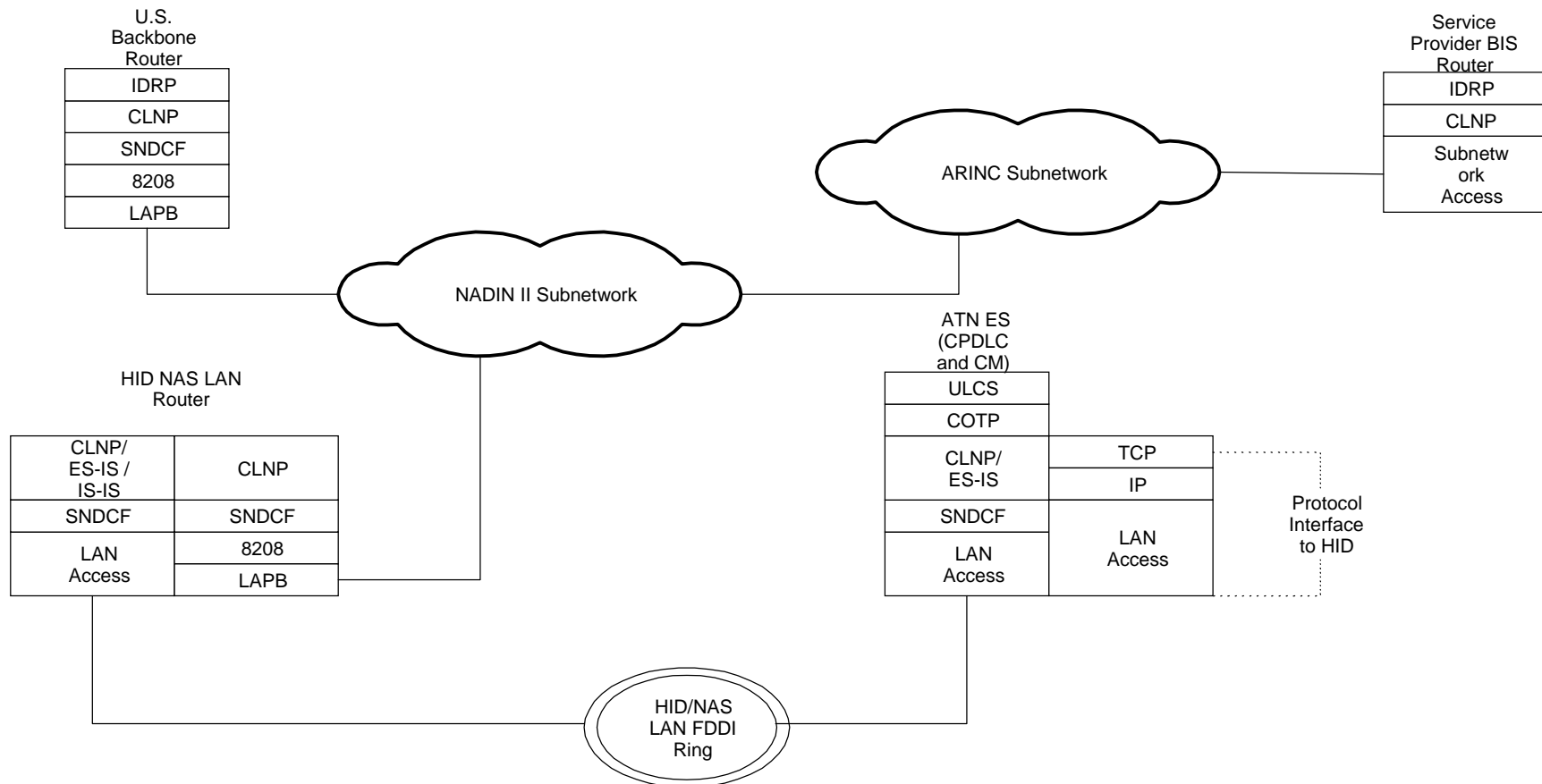
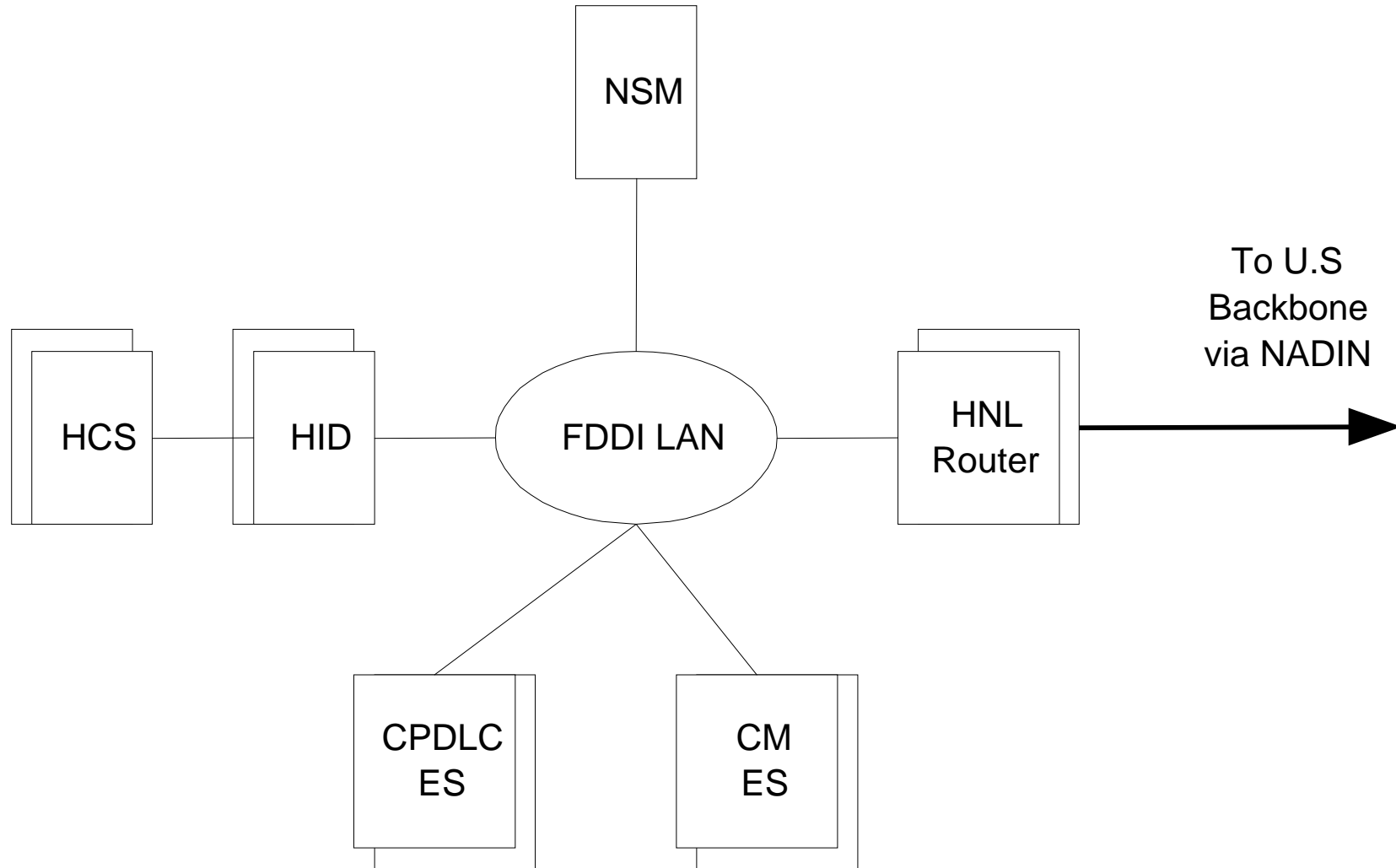# CPDLC-I Architecture Overview

BIS "A"

Ethernet

BIS "B"

Backbone Routing Area

NADIN X.25 PSN

ARINC BIS

ARINC Subnetwork

ARINC BIS

ARINC ATN Domain

HNL "A"

HNL "B"

FDDI Ring

CPDLC ES

CM ES

ARTCC En Route Routing Area

FAA ATN DOMAIN

Protocol Architecture

U.S. Backbone Router

IDRP
CLNP
SNDCF
8208
LAPB

Service Provider BIS Router

IDRP
CLNP
Subnetwork Access

ARINC Subnetwork

NADIN II Subnetwork

HID NAS LAN Router

CLNP/ ES-IS / IS-IS	CLNP
SNDCF	SNDCF
LAN Access	8208
	LAPB

ATN ES (CPDLC and CM)

ULCS		
COTP		
CLNP/ ES-IS	TCP	
	IP	
SNDCF	LAN Access	
LAN Access		

Protocol Interface to HID

HID/NAS LAN FDDI Ring

HID/NAS LAN Architecture

Test Methodology

Test Approach (total 103 test cases excluding Conformance test cases)

✓ **Conformance Testing:** **X.25 conformance based on ISO 88807 -2 and 3 test cases ~ 200 test cases**

✓ **Router System Management Testing: Capabilities tested**

- Router Activation
- Router Termination
- Log File Management
- Configuration File Management
- Status Information
- Statistic Information
- Managed Object Access
- Managed Object Notification Filtering
- Routing Data Base Access

Test Methodology (con'd)

✓ **Power testing**

✓ **Interoperability and Integration Testing**
- **FAA ATN BIS to ARINC ATN BIS**
  - ➔ **IDRP and CLNP tests**
  - ➔ **End-to-end ATN Internet**
- **HNL Router to FAA ATN BIS**
- **CPDLC/CM ESs to HNL Router**
- **CPDLC/CM ESs to FAA ATN BIS**
- **CPDLC/CM ESs to Simulated A/C using ARINC's Aircraft Simulation Tool**

Test Methodology(con'd)

✓ *Performance and Capacity Testing:* The FAA ATN Router Performance and Capacity testing activity is designed to determine if the system can handle the specified CPDLC-I ATN ES message exchange rate to the required number of aircraft.

➔ One, ten, fifty, hundred, and 400 aircrafts
  ➢ Normal and abnormal conditions
  ➢ Uplinks and downlinks
  ➢ Handoff and non handoff
➔ One hour and 72 hours stability tests

✓ **End-to-end Testing with Rockwell-Collins, ARINC, and FAA**
✓ **Site acceptance testing at Miami Center**
✓ **Flight Tests over Miami airspace**

Lessons Learned

- Test thoroughly with different implementations

- Base lining Configuration

- Develop simulators for traffic generation in absence of applications

- Develop automated Data Reduction & analysis (DR&A) tools

- SARPs implementation and interpretation