Advanced iDirect Operation and Maintenance Course Syllabus

Advanced iDirect Operation and Maintenance (AiOM)

The Advanced iDirect Operations and Maintenance (AiOM) course is intended for personnel responsible for second and third level escalations for the iDirect satellite products and networks. The iDirect Operations and Maintenance (iOM) course is a prerequisite to attend the Advance iOM training. The course will provide each individual with advanced knowledge needed to understand the operating and troubleshooting of an iDirect system.

This course satisfies requests from our customers to provide a course covering more in-depth information/knowledge about the iDirect equipment not presented in the iOM course. The course is based on information, our knowledge base, professional tips which were collected from our engineering group, TAC, and suggestions from our customers.

The course covers Advance RF and Data communication concepts and their relevance to the iDirect system. It also covers various features and inside/in-depth views of the system that would enable the students to have a deeper understanding of the iDirect system.

The course includes not only theoretical material but also practical exercises. Most chapters involve a demonstration of useful commands or exercises that are embedded into the chapter. In addition there are hands-on exercises which require all students to participate by logging in various components of the system and practice advance troubleshooting methods.

Presented in a clear and technical manner, the course provides a combination of lecture, demonstrations, and practical exercises that will give the student a comprehensive overview of advanced network operations from the iDirect perspective.

This is a four-day training course.

Course Outline:

- *Reviewing iDirect Technologies*
- *Layers 1 through 3*
- *Linux and Database*
- *Insights of NMS and Protocol Processor*

Handouts may be provided to supplement existing course material and to provide additional up-to-date details on currently released software and hardware components.

NOTE: All AiOM training will be conducted according to the latest versions. This course requires the attendees have iOM training and has iDirect network operation experience of 6 months. Learners are strongly encouraged to learn basics on routing and Linux system before coming to the class. Attendees maybe dismissed from the class if found inadequate knowledge level is retained prior to coming to the class.

Students are evaluated during the course of instruction to ensure that they have attained an advanced level of understanding that will enable them to operate iDirect equipment, as well as to diagnose problems as they occur. At the end of the class the student will receive a course final written exam and, upon successful completion of all course requirements will be given a certificate of completion.

Administrative

The section covers all administrative information for the learner to include:

1. *Welcome*
2. *Instructor Introduction*
3. *Points of contact*
4. *Training Hours and Attendance*
5. *Break and Lunch*
6. *Restroom*
7. *Attire and Professional Decorum*
8. *Rules concerning electronic devices (Cell phones, pagers, and other devices)*
9. *Faxes, UPS, Fed-Ex*
10. *Accommodations*
11. *Site Emergency Procedures*
12. *Course Introduction*
13. *Learner Skills and Knowledge Review*
14. *Course Goals and Objectives*
15. *Course Daily Activities*
16. *Course Materials (Learner Manuals, Workbooks, etc.)*
17. *Lab Safety*
18. *Final Examination*
19. *Learner Introductions*

Module 1: Reviewing iDirect Technologies

This first section reviews iDirect Technologies as the premier satellite broadband technology provider building on the information and materials from the Installation Operation and Maintenance course. The foundation for advanced topics to be covered in the AiOM course are reviewed, discussed and analyzed.

At the completion of this section the student should be able to:

- Understand and describe the iDirect Technologies.

- Describe the products (current & future) available from iDirect.

- Explain, discuss, and understand on an advance level:
    - Typical hub configuration

- o iDirect VSAT Network Architecture
- o Data, Monitor and Control Flows
- o Supported Network Topologies
- o Control and Management
- o Statistic Gathering
- o Supported features

Module 2: Layers 1 through 3

This unit is designed to closely follow the data-path while learning different layers of the protocol. Therefore the material is presented crossing multiple layers at different sections of the passage covering related logic and protocols. Learns will study layers 1 through 3 of iDirect system, basics on RF, modulation, and coding:

- iDirect SATCOM/RF concepts
  - o Basics of Satellite Communications
  - o RF Components
  - o Carriers and Signal Flow
- RF impairments
  - o Conditions causing interferences
  - o SCPC and CRC errors
- iDirect SCPC Downstream and TDMA Upstream
  - o BPSK, QPSK, 8PSK
  - o Turbo Product Code
  - o iDirect SCPC Downstream and its OTA Protocol
  - o TDMA Protocol
  - o 2D 16-State Protocol
  - o TDMA Upstream and its OTA Protocol including SAR/PAD, Chopper
- DVB-S2 Protocol and Feature
  - o Frames Structure
  - o Downstream DVB-S2 Protocol Structure
  - o Adaptive Coding and Modulation
- Layer 2 Protocols
  - o Ethernet and VLAN
  - o VLAN on iDirect
- Layer 3
  - o IP, GRE, and VLAN over iDirect
  - o Fundamentals on Routing
- Throughput

- o Calculating and Validating Throughput
- o Protocols and Throughputs

Module 3: Linux and Database

This module provides the essential means to managing and inspecting the NMS and Protocol Processor Blades at Operating System level, managing databases, and accessing iDirect core software components.

- Linux Basics
  - o iDirect Platform Basics and their relation to Operating System
  - o Red Hat EL, Essential Linux Commands and Manuals
  - o Hands on exercises reviewing and interpreting information at Linux level
  - o Traffic capturing and reviewing
  - o Evaluating various log files
  - o Concerning Security
- Database
  - o MySQL
  - o Configuration and Real-time Databases
  - o Consolidation and Backup scheduling
  - o Handling Databases
  - o Retrieving information from database

Module 4: Insights of NMS and Protocol Processor

This section discusses the insights of iDirect System along the data-path and also examines the system control:

- System Access
  - o Accessing NMSSVR
  - o Accessing Chassis Manager
  - o Accessing PP_CONTROLLER
  - o Accessing SAMNC and its sub-processes including SARMT, SAROUTER, SANA, and SADA
- Inspecting System Control
  - o Remote allocation to a blade
  - o Console command to control remote – Link Layer, ACQ, Reset
  - o Inspecting Timeplan on the Blade
  - o Inspecting UCP
  - o Inspecting Timeplan on the remote
  - o Remote MODCOD assignment (DVB-S2)

- Walking Along with Packets
    - Inspect packet arrival on the PPB Eth 0 interface.
    - Inspect routing table
    - Inspect link layer stats
    - Inspect spoofer stats
    - Inspect DVB-S2 stats
    - Inspect DFOE stats
    - Inspect bandwidth allocation
    - Inspect packet departure on PPB Eth1 interface
    - Inspect Hub Line Card stats for SCPC/DVB-S2 MODCOD
    - Inspect OOB stats on Falcon
    - Inspect Rx packets
    - Inspect HDLC stats
    - Inspect DVB-S2 stats
    - Inspect link layer stats
    - Inspect DFOE stats
    - Inspect sat0 stats
    - Inspect packet arrival to the remote
    - Inspect IP table on Falcon
    - Inspect ixp0 stats
    - Inspect QoS stats
    - Inspect slot usage
    - Inspect HLC Rx stats
    - Inspect packet arrival to the PPB Eth1 interface
    - Inspect IP remote stats
    - Inspect packet departure on PPB Eth0 interface
- Troubleshooting Points
    - Log files inspection
    - Core files inspection
    - Inspecting system limits

Hands-on, Demonstrations, and Exercises

Hands-on, demonstrations and exercises are interspersed throughout the entire Advanced iOM training course. Each learner will have the opportunity to display knowledge and skills obtained through the lecture and demonstrations performed by the instructor. At the completion of each demonstration and exercises the learner should be able to perform the task with minimal instructor assists.

Installation Operation & Maintenance Training Course	Day One	Day Two	Day Three	Day Four
0830 – 0920	Administrative and Module 1: Reviewing iDirect Technologies	Module 2: Layers 1 thru 3	Module 4: Insights of NMS & Protocol Processor	Module 4: Insights of NMS & Protocol Processor
0930 – 1020	Module 1: Reviewing iDirect Technologies	Module 2: Layers 1 thru 3	Module 4: Insights of NMS & Protocol Processor	Module 4: Insights of NMS & Protocol Processor
1030 – 1120	Module 1: Reviewing iDirect Technologies	Module 2: Layers 1 thru 3	Module 4: Insights of NMS & Protocol Processor	Module 4: Insights of NMS & Protocol Processor
1130 – 1150	Review/Q & A or Instructor Choice	Review/Q & A or Instructor Choice	Review/Q & A or Instructor Choice	Review/Q & A or Instructor Choice
1150 – 1250	Lunch	Lunch	Lunch	Lunch
1300 – 1350	Module 2: Layers 1 thru 3	Module 3: Linux and Database	Module 4: Insights of NMS & Protocol Processor	Review and SME Discussion
1400 – 1450	Module 2: Layers 1 thru 3	Module 3: Linux and Database	Module 4: Insights of NMS & Protocol Processor	Final Examination
1500 – 1550	Module 2: Layers 1 thru 3	Module 3: Linux and Database	Module 4: Insights of NMS & Protocol Processor	Final Examination & Exam Review
1600 – 1630	Review/Q & A or Instructor Choice	Review/Q & A or Instructor Choice	Review/Q & A or Instructor Choice	Certificate Presentation & Surveys Dismissal
1630 – 1700				

Course Critique, Certificate Presentation

Following the completion of the class, the course final exam will be given and reviewed. Course critiques will be distributed and collected after completion for review by iDirect Government management. Course completion certificates will be provided to each learner who has completed all assigned phases of instruction.