Aviat NETWORKS RDL-3000 Connectivity For Fixed and Nomadic Wireless Applications Installation Guide

Contents

Aviat NETWORKS RDL-3000 Connectivity For Fixed and Nomadic Wireless Applications

RDL 3000 INSTALLATION, COMMISSIONING, AND MAINTENANCE
TRN-RDL-3K-ICM

The RDL-3000 Operation, Configuration, Installation and Maintenance course is designed to provide hands-on training on the operation, configuration, commissioning, installation, and maintenance of the RDL3000 based on Version 3.2+ software features and capabilities. The course is conducted by expert trainers with extensive experience in microwave wireless and IP/MPLS networks.

Course Specifics

- Duration: 3 days
- Class capacity: 10 students
- Materials provided: Student Handbook (e-Book)

Course Description

The RDL-3000 Operation, Configuration, Installation and Maintenance course consists of 5 modules focusing on the RDL3000 operation, configuration, commissioning, installation, and maintenance based on the Version 3.2+ software features and capabilities.

This program is based on 60% hands-on lab work and 40% content slides. However, adequate backup material is provided in the training manuals for those who want to do more.
Courses are conducted by AVIAT expert trainers in a mentoring environment backed by their deep technology expertise and experience in implementation of microwave wireless and IP/MPLS networks.
The course is conducted at Aviat Training locations or can be arranged at customer sites.

Target Audience

This course is intended for Level-2 support groups, engineers, and technicians.

Pre-requisites

While the RCSP-RDL-3000-CV program starts with covering some basics of RF, networking and NMS, strongly

recommends the following expertise as pre-requisites:

- Working knowledge of the OSI network model, TCP/IP protocol suite, working of routers, bridges, Layer-2 and Layer-3 QoS and packet processing.
- Working and hands-on knowledge of VLAN systems
- Basic understanding of RF system and signal propagation
- Each student must have a laptop with administrative rights to install and run IP networking simulation software.

Objectives

Upon completing this course, the trainees shall understand and acquire hands-on knowledge of the RDL-3000 systems to use the following:

- The Working and operation of the RDL-3000 as a transparent and VLAN-aware layer-2 broadband wireless solution
- The technical features of the Ellipse Sector controller (SC) and each of the RDL-3000 remote terminals (RT) in the context of customer specific deployments – Edge/eLTE-MT/RAS-Elite/RAS-Extend and the RDL-3000 Connect Transport Gateways RTs (Connect- OW/OWS/IWS) in PTP and PMP deployments
- RDL-3000 radio types and their RF attributes such as Tx power, UL ATPC, receiver sensitivity, interference detection and mitigation capabilities (co-channel and adjacent channel) and UL noise floor measurement
- System architecture and building blocks at the MAC, PHY and RF levels and the performance attributes in applications for the Oil and Gas industry, video surveillance, backhauling and BWA deployments
- Operation and configuration of RDL-3000 systems in 1+1 redundancy (SC, RT, and link with PRP) deployments with expedited traffic switch over during link failure using the host-MAC access list (ACL) update feature (Rapid-Path)
- Performance limits of the RDL3000 MIMO-OFDM implementation – MIMO-A/MIMO-B and STBC
- The benefits of the multiple channel sizes offered by RDL-3000 system from the same hardware using deployment specific product options key – 0.875/1.25/2.5/3.5/5/7/10/14/20 MHz
- RDL-3000 performance at different frequency bands at all channel sizes using BPSK, QPSK, 16/64/256 QAM with state-of-the-art convolution coding for FEC and Viterbi decoding
- Configuring and optimizing the spectrum sharing features of RDL-3000 – DFS/CBP/WSDB
- Configuring RDL-3000 to eliminate multipath in LOS/OLOS/NLOS deployments and optimize link throughput
- Configuring and managing RT registration in the Ellipse SC – fixed and nomadic RTs using an STID template
- Data scheduling parameters in RDL-3000 for data, voice, and video applications
- Understand how the fast fusion link adaptation (FFLA) uses link CQI to dynamically adapt link UBR and MIMO mode to prevailing conditions including unusually deep fade conditions on per RT link basis
- The use and performance of fixed and variable wireless frame modes in RDL3000
- The use of and performance differences between the fixed and variable wireless frame modes
- Setting and ensuring time synchronization in RDL-3000 mitigates intra-cell and inter-cell interference
- The use of GPS in RDL-3000 to provide location services and frequency synchronization in RDL-3000 deployments
- Over the air QoS in RDL-3000 including CIR/PIR based on applications carried over the wireless link
- Data paths on the RDL-3000 wireless network using Subscriber Link, Service Group and Service definitions
- Packet classification using the 802.1Q tags, VLAN tagging/untagging/mapping and QinQ support

- The use of 802.1p markers for over the air transmission prioritization of user traffic
- Understanding the operation of, configuring, and using the VLAN list in RDL-3000 SC and RT
- Managing RDL-3000 systems using HTTP/HTTPS, CLI (Telnet/SSH) and SNMP V2/V3
- Setting up user authentication using Radius
- Understanding the use of and configuring the Elliptic Curve Cryptography (ECC) parameters to enable mutual authentication between an RDL-3000 SC and registering RTs.
- Enabling OTA data encryption with AES-128/256
- Understanding Secure mode and FIPS mode security requirements in RDL-3000 systems
- Enabling secure user credentials and learning the backup and restoring of salted user password SHA hash
- Link planning and link budgeting for RDL-3000 deployments based on capacity and coverage considerations
- Fundamentals of RF and frequency planning in the context of RDL-3000 deployments
- Installation of the Ellipse SC and RDL-3000 RTs in a step-by-step process, grounding and bonding based on best practices in the industry including R56 recommendations
- Alignment procedures of RDL-3000 RF links and performance evaluation of each link
- Performing capacity/coverage analysis and optimization of installed links, understanding interference KPI's in RDL-3000, inference identification and mitigation techniques dealing with CCI/ACI/AACI.

Course Outline

Module-1: RDL-3000 System Overview, Technology Foundations and Applications

- The broadband wireless solutions
- RDL3000 system from the OSI/TCP-IP networking
- Ethernet packet structure and heard parameters
- VLAN-based packet classification
- Layer-2 QoS
- RDL-3000 architecture
- MAC/PHY/RF parameters
- Hardware skewsof the Ellipse SC
- RDL-3000 remote terminals (EDGE, eLTE-MT, RAS-Elite, RAS-Extend and Connect-OW/OWS/IWS)
- Upcoming features in RDL-3000 at the MAC/PHY/RF
- Managing RDL-3000 using http/https/telnet/SSH/SNMP
- Software upgrading and IP/username/password recovery
- Use of LLDP in RDL-3000 systems
- DHCP IP addressing
- Creating secure user accounts

From the RDL-3000 (XP) and RDL-3100 (XG) technology point of view, the topics covered in this module include:

- Differences between fixed and variable frame modes and time synchronization
- Static and dynamic DL ratio
- MIMO-OFDM as implemented in RDL-3000
- Multipath handling capabilities

- Error detection and correction (ARQ and FEC)
- Dynamic adaptive modulation using the proprietary fast fusion link adaption (FFLA) algorithm.
- MIMO-A/STBC for enhanced reach and MIMO-B for enhanced throughput
- Use of multiple channels sizes (0.875/1.25/2.5/3.5/5/7/10/14/20 MHz)
- Multiple coding rates (from 1/2 to 7/8)
- Use of BPSK/ QPSK/ 16QAM/ 64QAM/ 256QAM
- Error handling in RDL-3000 links
- Options key controlling different product features and the options available: Secure Link, Metro Link, Smart Link, and Video
- RDL-3000 deployments in the Energy, Oil and Gas, ISP, and other deployment environments

Module-2: RDL-3000 System Architecture, Operation and Configuration

- Wireless link and data plane parameters of the RDL-3000
- RDL-3000 internal architecture
- Function of each module (switch, wireless MAC, MIMO-OFDM and RF module)
- Wireless configuration in the SC and RT with parameter selection examples
- Complete definition of QoS in RDL-3000
- Definition and functions of Subscriber Link, Group and Service
- The pass-through and tagged mode of operation for a Group and a Service
- acket processing and classification at the SC Ethernet port
- Mixed mode deployments
- Rapid Auto Provisioning (RAP)
- Automatic frequency scanning features
- Typical networking features of RDL-3000 deployments
- Strict VLAN networks for data as well as RT and host management
- The security features supported in RDL-3000

Module-3: RF Link Design and Planning

- RF parameters of PTP and PMP wireless links
- RDL3000 link budgeting
- Fresnel zone
- The BER and PER performance of each link type
- Antenna height requirements at different frequency bands
- Link availability for different applications
- Fade margin requirements
- RDL-3000 receiver thresholds
- The Link budgeting parameters
- RDL-3000 RF planning
- The built-in spectrum analyzer (Spectrum Sweep Function)

Module-4: System Installation, Link Alignment, and Interference Mitigation

- Installation of Ellipse SCs, RDL-3000 RTs, PoE injectors and lightning protectors (LPs)
- Pre-installation requirements
- RF exposure and safety guidelines
- RDL3000 installation
- Installation of the specific RTs applicable
- The wireless link alignment and the key performance indicators (KPI)
- RF monitor tool
- Implications of aligning antennas to the side-lobes, reflections causing issues due to wrong antenna tilt (overshoot and undershoot)
- Antenna height adjustment
- Analyzing alignment quality using RSSI min and RSSI max
- RSSI and SINADR relationship
- Packet discards and retransmission rate on the link
- Wireless systems interference indicators
- RDL-3000 KPIs for interference detection and mitigation
- Interference identification and mitigation

Module-5: Fault Simulation and Hands-on labs

Required Equipment for Training Sessions at Customer Sites

RDL-3000 Equipment Requirement for a Class of 8-10 Learners			
Item	Min Quantity	Specs	Remarks
SC Ellipse	4	Must be in the same frequency band	RTs with integrated antenna cannot be used in the class
EDGE RT	6		
SC antenna with brackets	1	This will be used for the installation module	
Lightning Arrestor	1	For demonstration of installation	
PoE Injector	10	802.3at compliant – preferably AC-DC type	
POE power chords	10	One for each PoE injector	
CAT5 cables	20 pieces	terminated according to the 568B or A standard- Straight cable is ok	
RF jumper cables	12 pieces		
Laptop/Desktop	**1 per Trainee**	Trainees should have admin privilege for the laptops	
Switch (unmanaged)	1 with 16 or more ports	Required for the ClearView course	
ClearView Server	Review this with the Aviat team – a laptop can be used		
Projector	1	Preferably one which can support high resolution laptop	
Flipchart and markers	3	Flip charts and markers (black, blue, and red)	

CLASSROOM SET UP

Sufficient in size to handle all participants, instructor, desks, chairs, classroom equipment. The room must have enough 110 AC (220) AC power and air conditioning to operate equipment, all students' client's PCs and the server or radio as required.

Hands-on participation of the trainees is subject to hardware availability in on-site sessions.

Pricing & Scheduling

Please contact your Aviat local sales team for a quote or email aviatcareeducate@aviatnet.com and request pricing for the following items:

TRN-RDL-3K-ICM Operation, Configuration, Installation and Maintenance Course (3-days)

Aviat Certified Operations Specialist (ACOS) Certification Exam – RDL3000 TRN-ACOS-EXAM-X

Course Specifics

Duration: Self-paced online assessment
Delivery Format: Online

Description

The Aviat Certified Operations Specialist Certification – RDL3000 Exam covers the assessments focused on developing skills required for installing, operating, and maintaining the Aviat RDL3000 microwave radio. This certification is a specialized track targeted at installers working with Aviat products and builds on the foundational product knowledge provided by the pre-requisite Aviat Networks Associate track.
Upon successfully passing the assessment, the student will be certified as an Aviat Certified Operations Specialist (ACOS) on RDL3000.

Target Audience

This exam is intended for individuals requiring ACOS certification for RDL3000.

Prerequisites

- Aviat Network Associate Certification and completed ILT or VILT on the RDL3000 Installation, Operation, and Maintenance course
- PC with Internet access, Internet browser software, and access and subscription to AviatCare LMS

Objectives

Upon completing this course, participants will be able to:
Demonstrate installation best practices and specialized installation-related skills for the RDL3000 platforms

Demonstrate specialized knowledge in the configuration, operation, troubleshooting, and maintenance of the RDL3000 microwave radio

Assessment

Completing and passing the assessment validates the students' knowledge and will provide students with the credentials necessary for the Aviat Certified Operation Specialist certification level for the RDL3000 radio.

Compliance

Upon successfully passing the re-certification exam, the individual is certified for 3 years. To renew, the individual must complete the recertification examination before the current certification expiration date.

Pricing & Scheduling

Please contact your Aviat local sales team for a quote or email aviatcareeducate@aviatnet.com and request pricing for the following items:

TRN-ACOS-EXAM-X Aviat Certified Operations Specialist Certification- Exam- price per student –

Specifications

- Duration: 3 days
- Class capacity: 10 students
- Materials provided: Student Handbook (e-Book)

FAQ (Frequently Asked Questions)

Q: Can I attend the course without prior networking knowledge?

A: While some basics are covered, having prior knowledge is strongly recommended for better understanding.

Q: Is the course material available in printed format?

A: Materials are provided in e-Book format for easy access and reference during the course.

Documents / Resources

	**Aviat NETWORKS RDL-3000 Connectivity For Fixed and Nomadic Wireless Applications** [pdf] Installation Guide RDL-3000, RDL-3000 Connectivity For Fixed and Nomadic Wireless Applications, Connectivity For Fixed and Nomadic Wireless Applications, Fixed and Nomadic Wireless Applications, Nomadic Wireless Applications, Wireless Applications

References

- **User Manual**