



www.redlinecommunications.com

RedMAX Product Support Certification Program

Redline Certified Support Professional (RCSP) –RedMAX Course Description

Course name:

RedMAX Operation, Installation Commissioning and Maintenance (RedMAX OICM)

Objective:

The RedMAX OICM certification course consists of 6 modules with its primary objective being to enable the attendees acquire the following abilities through the 3-days of hands-on training:

- Gain a basic understand of the technologies that enable Redline's RedMAX Product Platform(WIMAX) to deliver data across the wireless link with a carrier grade reliability at BER level of 1E-06 and 99.999% link availability.
- Understand the RedMAX operation and working at the MAC, PHY and RF levels in PMP, PTP and port-based VLAN tagging modes of operation.
- Understand the multi-path handling capabilities of the RedMAX system (AN-100U, SU-O and SU-I) to support Line of sight (LOS), optical line of sight (OLOS) and none-line of sight (NLOS) deployments.
- Understand the TDD and HD FDD operation of the RedMAX
- Understand how the RedMAX addresses today's asymmetric internet traffic pattern using TDD and Link Adaptation (Dynamic Adaptive Modulation) to realize the highest throughput under varying link conditions.
- Understand the working and configuration parameters of RedMAX systems in order to be able to configure the system for the most appropriate latency and throughput settings suitable for a given application.
- Understand the QoS requirements of different traffic flows in real life applications such voice, VoIP, video and best effort and to configure the RedMax system to ensure desired QoS and robustness.
- Understand the basic requirements of engineering an RF link for the RedMax system and learn to use effectively the RedMax link budget tool to design LOS, OLOS and NLOS RF links for deploying the RedMAX
- Learn through hands on work and experimentation effective and efficient methods of fault isolation and troubleshooting of the RedMAX RF links.
- Learn how to interpret and hence find appropriate solutions for the fault situations reported by the system.
- Understand the parameters of a cell-based RedMAX deployment, Base Station interference mitigation, collocation of multiple Sector Controllers and time synchronization feature of the RedMAX for interference mitigation.

Certification Criteria:

In order to receive the certification, students must RCSP-RedMAX certification exam

Registration Code: RCSP-RM-3

Course Duration: 3 days

Target Audience:

The target audience for this workshop includes engineers who will design, install, configure and operate the RedMAX system. Students who receive RCSA Certification are eligible to take the next level of certification, Redline Certified Support Professional (RCSP).

Delivery format:

Instructor Led as a stand alone course and Self-Paced-Learning for customers with RCSA certification.

Pre-requisite Knowledge Requirement:

- Data Networks: The OSI network model, TCP/IP protocol suite, working of routers, bridges, IP addressing, sub-netting and the working of VLAN systems.
- Transmission: Transmission components in the Transmit and Receive path of a digital communications system
- Digital modulation schemes such as BPSK, QPSK, QAM, digital communications systems performance parameters such as BER, PER, Latency
- Radio Frequency (RF) Systems: Basic understanding of RF signal propagation as a function of signal frequency, path loss models, fading models, frequency selective nature of the wireless channel, channel delay spread and Doppler effect
- Wireless Standards: 802.16 frequency allocation
- GPS coordinate systems and digital maps
- Working of TDM systems – knowledge of E1/T1 systems

RCSP-RedMAX Course Content Details

This course consists of 7 modules described below. The modular nature of the course makes it possible to customize the content to address learning requirements of different category of customer employees such as network administrators, System Engineers, technical managers, Installers, Field Support personnel and technicians.

Module-1 (RedMAX (WiMAX) Overview) discusses WiMAX, 802.16-2004 (.61d or Fixed Wireless) and the basic parameters of the 802.16d networks and how Redline's RedMAX incorporates them for optimizing throughput and realizing minimum latency while maintaining carrier class link reliability. This module covers in detail the RedMAX, differentiators, connectivity and link configurations as well as prominent RedMAX applications.

Module-2 (RedMAX System Building Blocks) covers RedMAX system architectural elements – Network Interface, MAC functions and parameters, OFDM PHY parameters with considerable emphasis on data throughput and multi-path handling capability and the RF system. The module gives in-depth explanation of how data is forward by the SC and SU-O/SU-I within the RedMAX network. RedMAX IDU-ODU connectivity, cable requirements, IF and RF power levels, data and management ports and system power requirements are fully discussed in this module.

MAC specific parameters such as packet classification, service flows, QoS and transmission policy assignment to service flows are discussed. The MAC common parts functionalities such as packing and ARQ parameters for different traffic streams are described. QoS parameters for UGS, BE, rtPS and nrtPS are discussed. This module also discusses the security sub-layer as implemented in the RedMAX. This module provides a clear understanding of how the 802.16-2004 compliant OFDM engine works and what advantages frequency interleaving, channel coding and dynamic adaptive modulation provide for BFWA solution. The module concludes with

a complete discussion on the SS and SC transceivers, CINR requirements and RSSI limits for the different channel sizes the RedMAX supports. Air-link interface duplexing (TDD as well as HD FDD) is also discussed in this module in the context of IP traffic, network latency requirements and throughput demand of various applications.

Module-3: RedMAX Wireless Link Design and Basic RF Planning – discusses wireless link planning attributes such as multipath impairments and link budgeting. Consider emphasize is placed in this module on choosing the right link parameters such antenna gain and installation height, channel size, modulation and coding, in order to design and obtain a LOS, NLOS or OLOS link most suitable to the throughput and latency requirements of the specific application. The second part of the module introduces basic RF planning focusing on cell-based deployment, optimum spectrum utilization and frequency reuse.

Module-4: RedMAX Management view and Configuration - explains configuring the RedMAX SC (AN-100U) using HTTP, CLI, Telnet and SNMP (RMS). Optimum settings of the RF, PHY, MAC and IP interface parameters explained to be set to their most appropriate values for the application and deployment in hand. The knowledge obtained in the previous 3 modules shall enable the trainee to configure and commission the RedMAX System. Special configurations of the RedMAX such as PTP pass through mode of operation, supporting WiFi on WiMAX, setting the CINR thresholds for a link with a specific propagation profile, IP assignment through DHCP servers and subnetting of the service flows in sector are further emphasized in this module. Packet handling using the SU-O 802.1Q support is fully explained and enabling the SU-O for remote management is discussed using DHCP-Turbo

Module-5: RedMAX System Installation and Link Alignment - discusses the installation of the RedMAX System by introducing link planning concept such as site survey, path profiling is discussing with reference to material covered in **module-3**. Equipment installation, IDU-ODU connectivity and associated parameters are explained. The module emphasized enough on the effective link alignment, identifying misalignment situation of the antenna systems and fine tuning of the link based on calculations done in module-3.

In the second part of the module, cell-deployment based co-location issues are highlighted and appropriate recommendations for Intra-Base-Station interference mitigation and inter-cell interference are made—antenna polarization diversity, C/I management, minimum physical separation and frequency reuse. This module also discusses grounding requirement and surge protection.

Module-6 (Fault Simulation and Exercises) analyzes the self-diagnostic tests carried out by the RedMAX system. Error and fault messages reported by the system are discussed and appropriate remedial steps are defined. The module focuses on system fault isolation and performance validation through a set of exercises in a 100% hands-on set up. Exercises include various product functionality validation, performance testing and verification.

More Information

For further information on training and certification, please contact the Redline Training Department at training@redlinecommunications.com.

About Redline Communications

Redline Communications is the leading provider of standards-based wireless broadband solutions. Redline's WiMAX Forum Certified™ systems and award-winning backhaul and transport products enable service providers and other network operators to cost-effectively deliver high-bandwidth services including voice, video and data communications. Redline is committed to maintaining its wireless industry leadership with the continued development of WiMAX and other advanced wireless broadband products. With more than 30,000 installations in 75 countries, and a global network of over 100 partners, Redline's experience and expertise helps service providers, enterprises and government organizations roll out the services and applications that drive their business forward. For more information, visit www.redlinecommunications.com.