

AGENDA

302- Military Satellite Communications In A Net-Centric, Transformational Communications World

Instructor: Mr. James A. Mazzei

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First Day

8:30 - 10:00 Unit 1.1 – Intro & Systems Review I

10:00 - 10:15 Break

10:15 - 11:45 Unit 1.2 – Intro & Systems Review II

The Introduction and Systems Review covers the basics of orbits and satellite frequencies. It then covers, with approximately 100 slides, the essential characteristics of the UHF, SHF and EHF satellite constellations, showing the satellite characteristics and functionalities. Considerations on purchasing and launching satellites are then addressed. Finally, some slides are (time is) devoted to the problems of jamming and penetration.

11:45 - 1:00 Lunch

1:00 - 2:30 Unit 1.3 – SATCOM Link Equations Model

The SATCOM Link Equations Model explains the general model of a communications satellite link from the source, through the terrestrial subsystem, the satellite terminal and the transmitted waveform to the satellite and the return connectivity. It does so giving the attendee a math equivalent to help him/her understand the characteristics and limitations of communications satellite channels and links.

2:30 - 2:45 Break

2:45 - 4:15 Unit 1.4 – Earth Station Technology

The Earth Station Technology module describes the different types of earth stations used in UHF, SHF and EHF communications. It then breaks down an earth station and addresses the individual segments, e.g., feeds, antenna pointing and tracking, high & low power amplifiers and frequency converters. Finally it covers the reason for precise SATCOM control.

Second Day

8:30 - 10:00

Unit 2.1 – Code Division Multiple Access, Anti Jam and IP over Satellite

The CDMA/AJ/IPoS module explains CDMA as a communications satellite multiple access technique and as a baseline for protection against jamming. It then covers the different types of jamming with an analytical view of jammer to signal ratios. Finally, the module covers the Internet protocol as used in satellite links and the limitations thereof. The module includes a CDMA exercise/equation so that attendees have a vehicle for better understanding the new CDMA systems coming on line.

10:00 - 10:15

Break

10:15 - 11:45

Unit 2.2 – Network Centric Workshop

The Network Centric Workshop module looks at the components of what we call the net-centric world. It addresses standards and protocol stacks from a conceptual standpoint with a view of what they mean to the warfighter. It then covers their implementation in LANs and wide area networks and transitions into the dangers of military communications in an IP driven world. Finally, the module has some math exercises so that the attendee can get a feel for issues such as timeliness and capacity in military satellite communications.

11:45 - 1:00

Lunch

1:00 - 2:30

Unit 2.3 – Commercial Fixed Satellite Systems

The Fixed Satellite Systems module covers commercial communications from its initiation with the U.S. Communications Satellite Act to the current time. It includes discussions of INTELSAT, MDA, SES and other major commercial constellations. It highlights the differences between military and commercial systems, which operate on very different baselines. It also covers VSat systems and other domestic initiatives such as DirecTV.

2:30 - 2:45

Break

2:45 - 4:15

Unit 2.4 – Commercial Mobile Satellite Systems and Ka-band

The Mobile Satellite Systems module covers the mobile equivalent of fixed satellite services. It addresses the successful mobile companies such as INMARSAT, Iridium and ORBCOM. The module also addresses the emerging Ka-band systems which are opening the door to substantially greater capacities for commercial and military communications.

Third Day

8:30 - 10:00

Unit 3.1 – Mega Satellite Systems

A number of new international satellite initiatives by corporations such as SpaceX, OneWeb, Telesat, Kuiper and others are planning to remake satellite communications and international internet access. They are high stakes and high risk endeavors with unique capabilities and issues related to each proposed constellation. The module addresses the basic design, advantages, disadvantages, and projected success potential of each system.

10:00 - 10:15

Break

10:15 – 11:45

Unit 3.2 – UHF Communications

The UHF Communications Module covers highly mobile communications systems. It traces the foundations of these satellite capabilities and reviews the different access techniques such as demand assigned multiple access which are primarily used in systems that support highly mobile forces. The module also covers the Mobile User Objective system (MUOS) which dramatically increases capacities over the 5 KHz and 25 KHz channels that compose the legacy UHF networks.