|  |
| --- |
| **DAY ONE: WEDNESDAY 26 MARCH** |
| 1. Introduction:    * What is satellite communications?    * Types of satellite:      + Communications, broadcasting, government, and military, weather, scientific, earth observation.    * History of satellite communications.    * Terms and acronyms explained.    * Sources of information. |
| 1. What is a Satellite?    * Spacecraft descriptions:      + Bus and payload.      + Stabilisation:        - Three axis / spin stabilised    * Payload description:      + Transponders.    * Software-Defined Satellites.    * Antennas:      + Fixed, steerable, phased array, unfurlable (umbrella and frame), digital beam forming and scanning spot beams.    * Footprints:      + Global, regional, spot beams.    * Inter-Satellite Links:      + Radio and optical.    * Missions:      + Fixed services, mobile, TV broadcasting, audio broadcasting and DARS, multimedia satellites, navigation, GPS, low data rate messaging.    * Satellite Control:      + Telemetry and tracking / telecommand.      + Attitude control.      + Station-keeping.      + Satellite lifetime / fuel. |
| 1. Basic orbital mechanics:    * How do satellites stay in orbit? 2. Launch / transfer orbit / GSO insertion:    * Geostationary (GSO):      + Inclined orbit operation.    * Non-geostationary Orbits:      + LEO, MEO, elliptical, polar.    * Space Debris.    * Radiation belts. 3. NGSO and GSO:    * Typical orbits.    * Satellite lifetime.    * Latency. |
| 1. Satellite Launches:    * Reusable / expendable launchers.    * Chemical vs electric orbit raising.    * Launch sites.    * Launch cost trends. |
| 1. Earth Stations:    * + Fixed satellite services.      + Gateway earth stations.    * Mobile services:      + Luggable, briefcase size and handheld    * Earth station antennas:      + Typical sizes, geometry, applications, cost.    * Specialised applications:      + Maritime and aeronautical    * Subsystems and components:      + RF and baseband description. |
| 1. The Techie Bits:    * The link budget:      + EIRP and G/T, bandwidth, beamwidth, propagation, fade countermeasures, analogue and digital transmission, footprints, frequency bands, link margins, modulation schemes (PSK/QAM), multiple access schemes, (TDMA, FDMA, DAMA), error correction.      + Higher order modulation schemes. |
| 1. Spacecraft manufacturers:    * Old Space:      + Boeing / Airbus / Lockheed Martin / Maxar / MDA / Thales Alenia Space / NSIL / CGWIC.    * New Space:      + Astranis / SwissTo12 / Saturn / others. 2. Ground Segment:    * Gateway earth stations.    * VSATs.    * Mobile earth stations (ESIMs). 3. Service providers:    * Teleports and Services:    * VSAT Operators. |
| 1. Satellite Finance (Nick Flitterman, Portland Advisers)    * How to fund satellite projects:      + Characteristics needed to attract investment and lenders.      + Types of funding available.      + Sources of funding, depending on business proposition, region, funding need.    * What to expect in a fundraising process:      + Preparation.      + Due diligence process.      + Negotiation.    * Documentation. |
| **DAY TWO: THURSDAY 27 MARCH** |
| 1. Applications:    * Video broadcasting.    * Mobile satellite services:      + Maritime.      + Aeronautical.    * Internet access. |
| 1. Satellite Operators:    * Global.    * Regional.    * National. |
| 1. Regulatory / Orbits and Frequencies (Christian Keogh, DLA Piper):    * International Telecommunications Union.    * Regional and national regulators. |
| 1. Space Junk and Sustainability (Andrew Faiola, Astroscale)    * Space Situational Awareness (SSA).    * Active Debris Removal (ADR).    * End-of-Life Services.    * In-Orbit Servicing. |
| 1. Legal and Regulatory (Christian Keogh, DLA Piper):    * "Market access" - service regulation and frequency regulation.    * Space licensing.    * Space sustainability.    * Export controls, security issues.    * Safety and radiation hazards. |
| 1. New Developments:    * NGSO:    * Direct to Device:    * More to Come? |
| 1. Introduction to space risk management and insurance (Adam Sturmer, Marsh Space Projects):    * The satellite and space insurance market overview.    * Failure scenarios:    * Launch, transfer orbit, in-orbit.    * Historical failure rates for launch and in-orbit cover.    * Recent trends and the future. |
| 1. My Life as a Satellite CEO (GE Satellites and AsiaSat): Andrew Jordan (Sonema). |