# Certified Satcom Associate (CSA)

Exam syllabus and candidate guide · Issued by Satcom School

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| QUESTIONS<br>**50 multiple choice** | DURATION<br>**90 minutes** | PASSING SCORE<br>**70% or higher** | FORMAT<br>**Online, proctored** |
| LANGUAGE<br>**English** | EXAM STRUCTURE<br>**5 core + 45 random** | VERIFICATION<br>**Unique credential ID** | VALIDITY<br>**No expiration** |

## About the exam

The CSA validates foundational knowledge of satellite communications. Every candidate answers 5 core questions, plus 45 questions drawn at random from the CSA question bank, so no two exams are the same. The exam is taken online under identity-verified proctoring.

Candidates who pass receive a digital credential with a unique credential ID and a verification link that employers can use to confirm its authenticity.

## Exam domains

### 01 Digital Communication Fundamentals

- Basic structure of a communication system (transmitter, channel, receiver).
- Analog vs. digital signals.
- Role of transducers, encoders, and modulators.
- Communication channels and signal degradation.
- Electromagnetic waves as carriers of information.

### 02 Wired vs Wireless vs Satellite Communications

- Key differences between wired and wireless transmission.
- Why satellite is used: coverage, latency, independence.
- Core elements of a satellite link (uplink, downlink, teleport, modem, NOC).
- Performance metrics: latency, coverage, throughput.

### 03 Satellite Orbits and Coverage Models

- Characteristics of GEO, MEO, and LEO orbits.
- Real-world constellations: Starlink, OneWeb, Iridium, O3b mPOWER.
- Beam types: global beam, spot beam, steerable beams.
- Impact of orbit choice on coverage, latency, and application.

## 04 Frequency Bands and Propagation

- C, Ku, and Ka bands: differences in bandwidth, interference, and performance.
- Rain fade and weather effects.
- Polarization and frequency reuse.
- Spectrum regulations and licensing basics.

## 05 Ground Segment Components

- Overview of RF chain: BUC, LNB, OMT, waveguides.
- Antenna types: parabolic, flat panel, steerable.
- Indoor vs Outdoor Units (IDU/ODU).
- VSAT vs Teleport architecture.

## 06 Modulation and Access Techniques

- Common modulation schemes: QPSK, 8PSK, 16APSK, 32APSK.
- DVB-S2 / S2X and other waveform standards.
- Forward Error Correction (FEC) concepts.
- Multiple access techniques: TDMA, SCPC, MF-TDMA.
- Adaptive Coding and Modulation (ACM), DAMA.

## 07 Commercial Platforms and Industry Tools

- Overview of vendors: Comtech, iDirect, Newtec, UHP, etc.
- NMS platforms: iMonitor, SatLink, SatManage.
- Typical modem functionalities and configurations.
- IP routing and performance monitoring basics.

## 08 Emerging Technologies and the Future of Satcom

- Sat2Phone: AST SpaceMobile, Starlink Direct to Cell.
- High-Throughput Satellites (HTS) and dynamic capacity allocation.
- Flat panel and electronically steerable antennas.
- Satellite integration with 5G and hybrid networks.
- Virtualized satcom and software-defined payloads.

## 09 Use Cases and Real-World Applications

- Aviation, maritime, defense, remote education, disaster recovery.
- Rural connectivity and community networks.
- How real-world constraints (cost, geography) shape system choices.
- Trade-offs: coverage vs latency vs throughput.

## 10 Link Budget and Performance Analysis

- Link budget equation and terms (EIRP, G/T, path loss).
- Carrier-to-noise ratio (C/N, $C/N_0$), $Eb/N_0$.
- System margins and fade margin.
- Rain fade models and dynamic link adaptation.

## 11 Satellite Network Architectures

- Star vs mesh vs hybrid topologies.
- Hub-and-spoke VSAT vs mesh VSAT.
- Trunking vs access networks.
- Multicast, broadcast, and unicast flows.
- Examples: HTS networks, LEO mesh routing (Starlink), GEO-centric architectures.

## 12 Security in Satellite Communications

- Encryption protocols (AES, VPN, IPsec over satellite).
- Jamming and anti-jamming techniques.
- Cybersecurity in NMS and virtualized systems.
- Physical security of gateways and terminals.

## How to prepare

### Udemy course (included)

"Satellite Communications: GEO, MEO, LEO, D2D & 5G NTN": 39 video lectures, 37 quizzes and 2 practice tests.

### Training manual PDF (included)

"Satcom Fundamentals: The Training Manual": the core study guide covering every exam domain, with practice Q&A.

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