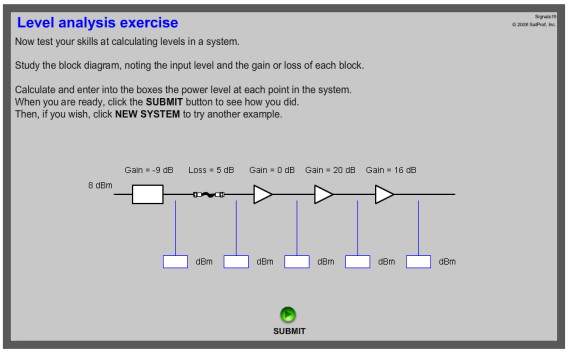
Satcom Fundamentals

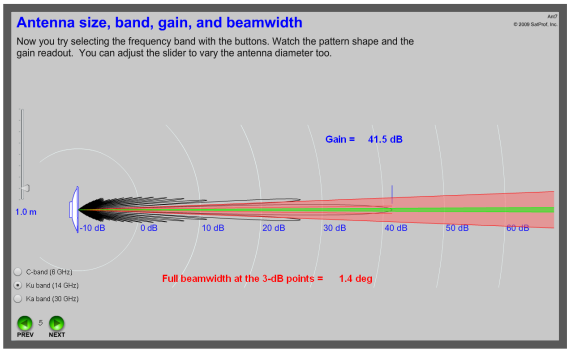
GVF 520

GVF520, the second in a series of three online courses leading to GVF Advanced Satcom Professional Certification, provides the student with a thorough understanding of the fundamental theories of VSAT communications. This knowledge is essential for every skilled and effective satellite ground equipment terminal field technician.

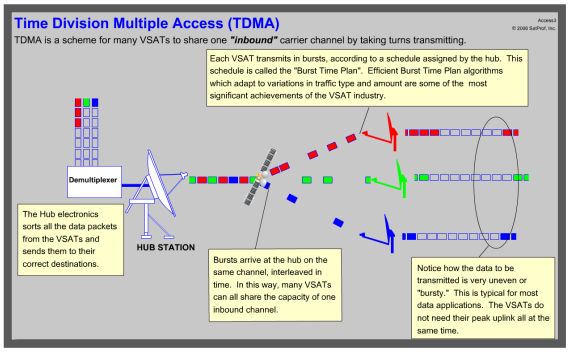
The course is appropriate for all installers and field technicians who may be responsible for activating any type of VSAT terminal, as well as engineers and technicians desiring a technical introduction to two-way satellite communications.



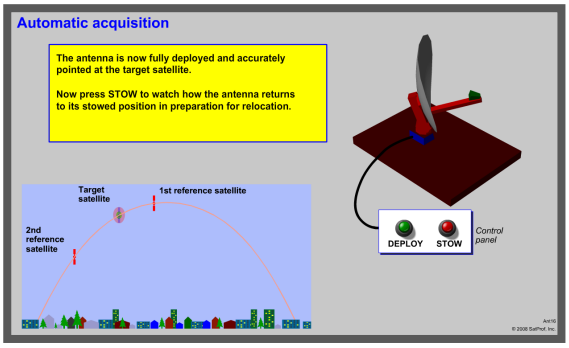
Gains, losses, and levels and dB theory are taught with interactive animations. Students practice their calculation skills with interactive exercises.



Interactive simulators allow students to explore relationships of antenna sizes, patterns, gains, and beamwidths.



Access method concepts such as TDMA are explained with clear animations.



Auto-deploy and stabilized antennas are explained using 3-D animations, giving operators of these mobile terminals the understanding for troubleshooting.

GVF TRAINING AND CERTIFICATION PROGRAM

GVF's award-winning program encompasses operation, installation, and maintenance of VSAT, marine, and mobile/SNG satellite terminals, in addition to general satcom theory. GVF training is a key part of **interference prevention**.

GLOBAL ACCESS

Students learn, practice, and demonstrate their knowledge and skills with online, interactive, simulator-driven training modules developed by SatProf, Inc. Courses are self-paced and available 24/7.

Hands-on skills testing and supplementary classroom sessions are supported by GVF Examiners and Regional Training Centers located in every major region of the world.

INTEGRATED TRAINING

The GVF curriculum can be integrated with your organization's own online and classroom training on a custom portal provided by GVF, to serve your staff and customers.

WHY CERTIFICATION?

Certification demonstrates and documents your commitment to peers, employers, customers, and competitors that you use industry - endorsed best practices . It will give you and your company a competitive advantage.

Certificate holders may appear in the *Certification Database* on the GVF training website.

FOR MORE INFORMATION AND TO REGISTER

www.gvf.org/training
gvfsupport@satprof.com

TRAINING CONTENT AND SERVICES BY

BR-8 (Rev Feb 2014)

SUMMARY: Fundamental theory of VSAT communications for all VSAT technicians and engineers.

CONTENTS:

1. Learning system orientation.
2. Course introduction, including review of GVF Certification requirements.
3. Satellite communications overview, including spacecraft, transponders, and launch vehicles.
4. Orbits, with interactive simulator-based orbital mechanics experimenters and 3-D constellation animations.
5. Footprints, explaining EIRP, G/T, contours, and their relationships to dish size.
6. Waves, including interactive experimenters for amplitude and frequency; latency; satcom bands.
7. Gains, losses, and levels, covering fundamentals of dB and level calculations, with interactive animated exercises.
8. Signals, noise, and spectrums, including real-time spectrum simulation of bandwidth, noise, and C/N.
9. Modulation, with animated explanations of QPSK, 8PSK, etc, forward error correction, and bit error rate.
10. Antennas, including sidelobes, patterns, and gain, with interactive experimenters.
11. Propagation, including rain fade, blockage, snow/ice effects, and animated solar transit outage demonstration.
12. Satellite links, with breakdown of how a link budget concepts, link margins, and availability.
13. Polarization, with 3-D interactive animations of linear and circular pol waves, feed systems, and XPD.
14. Earth station and VSAT equipment, including expanded discussion of components found in larger earth stations.
15. Access methods, with animated diagrams of SCPC, TDMA, TDM, DAMA, and DVB.
16. Mobile VSAT overview, including 3-D illustrations of auto-deploy and marine stabilized antennas.
17. Considering VSAT networks, with discussion of cost, regulatory, safety, and installation issues.
18. Comparing satellites, including review of satellite advantages and alternatives for specific services.

PREREQUISITES: Course GVF510 is recommended as a prerequisite for students intending to achieve GVF certification.

DURATION: Approx. 450 pages, requiring 10-20 hours study.

DELIVERY: Animated & interactive HTML/Flash, self-paced, on-line format. Requires Internet access while studying the course material. High speed access is preferred but is NOT required. Student's computer must have a current browser and the current version of the Adobe Flash player (free) installed.

LEARNING OBJECTIVES: General understanding satellite communications theory at a technician level; Compare satellite, wireless, wired, and fiber communications and their preferred applications; Describe spacecraft physical size, payloads, transponders, antennas, lifetime; Describe typical launch vehicles; Compare LEO, MEO, and GEO orbits; Identify GEO arc as viewed from the earth and space; Describe the concepts of links, link budgets, and how they are affected by dish size; Define qualitatively EIRP, G/T, footprints, and contours ; Describe the main properties of microwaves and how signals are affected by blockage; List the frequencies bands used for satellite communications; Define rain fade loss, rain zones, availability; Explain solar outages; Describe the operation of a satellite transponder. Compare co- and cross-pol transponders. Define linear polarization, polarization angle, cross-pol alignment and interference, pol re-use, and circular polarization. Identify the main hardware components in a VSAT and a larger earth station. Define the functions of the antenna, LNB, TRF, BUC, IFL, OMT, waveguide, and modem. Compare the main types of antennas used for earth stations. Describe sidelobes and beamwidth. Describe the relationships between antenna size, frequency band, beamwidth, and gain. Describe the how inclined orbit satellites affect ground antennas. Define amplitude, frequency, decibels, gain, EIRP, spectrum, symbol rate, bandwidth, noise, power, C/N, and Eb/No. Define modulation and demodulation. Describe and compare BPSK, QPSK, and 8PSK. Define and describe SCPC, TDM, TDMA, MF-TDMA, DVB, DVB-RCS, star, and mesh networks. Describe the functions of a LAN, Ethernet, IP address, subnet, gateway/router address, DNS, DHCP, NAT. Define the functions of nonroutable addresses, ping, and tracert. Identify and compare auto-point and stabilized antennas. Describe the process of automatic acquisition in an auto-point antenna.