



INSTALLING
RELIABILITY

A NEW DIMENSION
IN SATELLITE
COMMUNICATION

SKYWAN 5G COURSE OVERVIEW

Updated: Version 2.2 DL



TABLE OF CONTENTS:

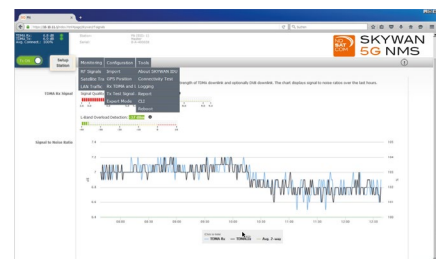
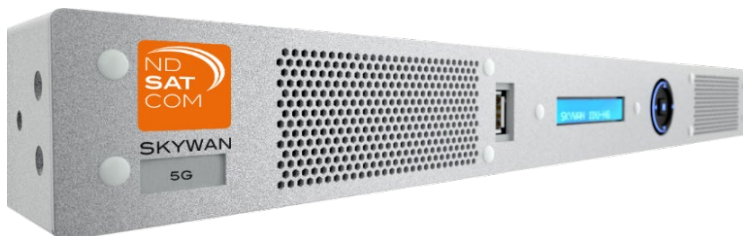
1	COURSE OVERVIEW: SKYWAN 5G	3
1.1	Station Commissioning (9140).....	5
1.2	Network Commissioning & Operation (9240)	6
1.3	Network Commissioning & Operation Advanced (9250)	7
1.4	Network Design & Engineering (9340).....	8
2	OPTIONAL COURSE MODULES	9
2.1	Installation Basics (8010).....	9
2.2	Satellite Communication Fundamentals (8000).....	10
2.3	DVB S2 (9245).....	11
3	COURSE CERTIFICATE	12

1 COURSE OVERVIEW: SKYWAN 5G

NDSATCOM offers training in various areas such as installations, operations, maintenance and management of our products and solutions. Convenient **classroom & hands-on training** is available all year-round at our training centre in Immenstaad. We also offer trainings on request at our regional branches or at customer premises.

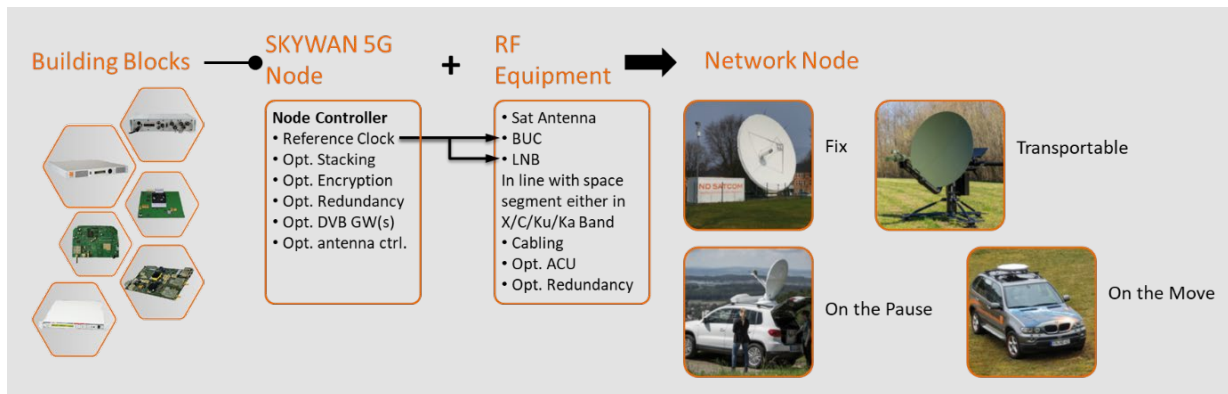


NDSATCOM training is the most efficient way to get a full comprehension of the ND SATCOM SKYWAN VSAT system and fundamentals of satellite communication technologies.



The following training course catalogue bases on the new SKYWAN 5G generation. Detailed descriptions of well-proven predefined courses about SKYWAN are available for review.

Beside the SKYWAN predefined courses, various customized training packages are possible. Such courses will be defined according to customer specific needs and requirements. The flexible content can be a selection of existing course modules enriched by additional customer topics. For the arrangement of a customized package, please contact our training experts. The professional training courses are covering all relevant topics for SKYWAN satellite networks. Our hands-on training enables you to quickly install your VSAT stations, discover how to commissioning and operate your network and learn through ongoing monitoring and maintenance how network downtime can be minimized.



The following figure illustrates the standard course overview for SKYWAN satellite networks:

Tasks	NETWORK DESIGNER	NETWORK OPERATOR	STATION COMMISSIONER
Entry / Beginner	Satellite Communication Fundamentals (VSAT) Course 8000 2 days		
			Installation Basics (VSAT station) Entry level Course 8010 1 day
Basic / Specialist	Network Design & Engineering Basic Level Course 9340 3 days	Network Commissioning & Operation Basic Level Course 9240 5 days	Station Commissioning & Maintenance Course 9140 2 days
Advanced / Expert		Network Commissioning & Operation Advanced Course 9250 4 days	
Optional		DVB-S2 option for SKYWAN 5G Networks Course 9245 1 day	
		Expert Certification Network Operator 1 day	Expert Certification Station Commissioner 1 day

1.1 Station Commissioning (9140)

Title	9140 - SKYWAN 5G Station Commissioning
Level	Basic / Specialist
Objectives	<p>The participant will be able to: Prepare & commission a SKYWAN station to become a member of a SKYWAN network and perform tests at station level, i.e.:</p> <ul style="list-style-type: none"> • Install a SKYWAN indoor unit, • Setup a SKYWAN IDU with a predefined parameter set, • Run station specific functional tests, • Control relevant parameters for proper station operation, using also IDU Expert Mode/CLI, • Perform advanced trouble shooting procedures
Contents	<p>Description of SKYWAN solution:</p> <ul style="list-style-type: none"> • SKYWAN features, hardware & interfaces, • Configuration file & software images, • SKYWAN station setup wizard. <p>Installation steps & Line-up procedure:</p> <ul style="list-style-type: none"> • Loading a predefined configuration, • Change essential configuration parameters, • Required information for proper Line-up, • Procedures (perform Line-up). <p>Station commissioning and operation:</p> <ul style="list-style-type: none"> • Run standard site acceptance test (SAT) procedure, • Basic monitoring (i.e. via IDU Web UI and LED indications), • Troubleshooting procedure (Identify & localize general failures).
Target Group	SKYWAN 5G - Station Commissioner (installation staff)
Duration	2 days (1 additional day for Expert Certification)
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • Good knowledge in 'satellite communication fundamentals (VSAT)', • Good knowledge in 'installation basics (VSAT)' (e.g. like course 8010), • General good English language skills.
Environment	SKYWAN 5G hardware, PC or notebook.
Methods	Lecture, demonstrations, practical exercises.

1.2 Network Commissioning & Operation (9240)

Title	9240 - SKYWAN 5G Network Commissioning & Operation
Level	Basic / Specialist
Objectives	<p>The participant will be able to: Plan and configure an entire SKYWAN network ready for network operation based on a predefined design, i.e.:</p> <ul style="list-style-type: none"> • Set and maintain network & station parameter configuration, • Configure and adjust network management relevant parameters, • Monitor & control relevant parameters for network operation, • Maintain the required grade of service within the network. <p>This course is the mandatory prerequisite for the participation in the additional certification course 'Expert SKYWAN 5G Network Commissioner'.</p>
Contents	<p>Brief description of SKYWAN solution:</p> <ul style="list-style-type: none"> • SKYWAN 5G IDU features, • SKYWAN 5G NMS features. <p>SKYWAN NMS installation Parameter configuration and user IP-traffic:</p> <ul style="list-style-type: none"> • Initial network configuration, • Satellite link, • IP-feature overview (OSPF/VRF) • Router configuration <p>Monitor & control relevant parameters for operation:</p> <ul style="list-style-type: none"> • Reconfiguration cases (fully meshed to star; new frequencies), • Pitfalls & troubleshooting, • Monitoring TDMA parameters <p>NMS network tasks:</p> <ul style="list-style-type: none"> • Network adjustments, • Network trouble-shooting procedures,
Target Group	SKYWAN 5G - Network Operator
Duration	5 days
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • Good knowledge in TCP/IP basics, • Good knowledge in 'satellite communication fundamentals (VSAT)', • General good English language skills.
Environment	SKYWAN 5G hardware, PC or notebook with SKYWAN NMS software, inter-cabling of some SKYWAN stations for a small network.
Methods	Lecture, hands-on with NMS tools, demonstrations, practical exercises.

1.3 Network Commissioning & Operation Advanced (9250)

Title	9250- SKYWAN 5G Network Commissioning & Operation Advanced
Level	Basic / Specialist
Objectives	<p>The participant will be able to:</p> <ul style="list-style-type: none"> • use advanced NMS user interfaces (CLI, Station Configuration menu) for network & station parameter configuration, • understand and configure advanced IP network features, • understand and configure advanced satellite link features, • understand and configure Point-to-Point satellite links • use advanced NMS tools for Network monitoring and troubleshooting,
Contents	<p>Advanced NMS user interfaces:</p> <ul style="list-style-type: none"> • NMS CLI, • Station configuration menu, • Station Live status menu, <p>Advanced IP networking features:</p> <ul style="list-style-type: none"> • Border Gateway Protocol (BGP) • GRE tunnels, • IP multicast <p>Advanced satellite link features:</p> <ul style="list-style-type: none"> • Multi request channel mode, • Communication on the move, • Satellite Link Layer Encryption • Adaptive Coding and Modulation (ACM) <p>SKYWAN 5G Point-to-Point Link option NMS server administration tasks</p>
Target Group	SKYWAN 5G - Network Operator
Duration	4 days
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • Participation in ND SATCOM course 9240, • Good knowledge in 'satellite communication fundamentals (VSAT)', • General good English language skills.
Environment	SKYWAN 5G hardware, PC or notebook with SKYWAN NMS software, inter-cabling of some SKYWAN stations for a small network.
Methods	Lecture, hands-on with NMS tools, demonstrations, practical exercises.

1.4 Network Design & Engineering (9340)

Title	9340 - SKYWAN 5G Network Design & Engineering
Level	Basic / Specialist
Objectives	<p>The participant will have general knowledge about:</p> <ul style="list-style-type: none"> • Designing & engineering SKYWAN satellite networks, • Usage of the SKYWAN TDMA calculation tool.
Contents	<p>Brief description of SKYWAN solution:</p> <ul style="list-style-type: none"> • SKYWAN features, • SKYWAN MF-TDMA technology. <p>General carrier design:</p> <ul style="list-style-type: none"> • Traffic calculation (Networking features overview; calculation tool & procedure), • Carrier design (Essential satellite link layer features: Master/ Slave concept, channel coding & modulation, topologies, data transport; TDMA parameter optimization tool & procedure). <p>Outdoor unit design (incl. satellite selection):</p> <ul style="list-style-type: none"> • Essential satellite link features, • Choice of satellite / transponder, • Outdoor unit design process, <p>Detailed indoor unit design:</p> <ul style="list-style-type: none"> • Networking features • (IP features: IP router, static routing, dynamic routing (OSPF), differentiated services, VRF; • Detailed SKYWAN IDU data (Indoor unit structure; technical specifications IDU 5G Series). <p>Design finalization & cost optimization:</p> <ul style="list-style-type: none"> • Optimization of network design, • Operational costs versus hardware costs.
Target Group	SKYWAN 5G - Network Designer
Duration	3 days
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • Good knowledge in 'satellite communication fundamentals (VSAT)', • General good English language skills.
Environment	PC or notebook with SKYWAN 5G TDMA calculation tool.
Methods	Lecture, demonstrations & exercises, hands-on tool training.

2 OPTIONAL COURSE MODULES

2.1 Installation Basics (8010)

Title	8010 – Installation Basics (VSAT Station)
Level	Entry / Beginners
Objectives	The participant will be able to: <ul style="list-style-type: none"> • perform the proper installation of a VSAT station, • do the antenna pointing, • use the necessary equipment & tools.
Contents	The following topics are included: <ul style="list-style-type: none"> • Antenna assembling & mounting (theoretical), • Grounding & lightning protection (theoretical), • Cabling (optional), • Mounting of ODU equipment, • Antenna pointing (practical).
Target Group	Especially for persons new with installation tasks, who want to participate in the product specific courses (i.e. ND SATCOM course for “station commissioning”).
Duration	1 day
Prerequisites	The following prerequisites are mandatory for the participant: <ul style="list-style-type: none"> • Basic knowledge in ‘satellite communication fundamentals (VSAT)’, • General good English language skills.
Environment	Spectrum analyzer, antenna system with RFT & LNB.
Methods	Lecture, hands-on (partly outside classroom), demonstrations, practical exercises.

2.2 Satellite Communication Fundamentals (8000)

Title	8000 Satellite Communication Fundamentals (VSAT)
Level	Entry / Beginners
Objectives	The participant will get good knowledge about satellite communication fundamentals and will get the prerequisite knowledge to continue with our product specific courses.
Contents	<p>The following topics are included:</p> <ul style="list-style-type: none"> • History & benefits of satellite communication, • The satellite & the satellite link, • Units & definitions, • Multiplexing methods, • From voice to bits – digitization basics, • From bits to waves – modulation basics, • Basic VSAT ground station overview, • Antenna basics, • Transmit & receive components (demonstration waveguide), • Safety at work, • Spectrum analyzer basics, • Optional: Hands-on antenna pointing exercise.
Target Group	Anyone interested in satellite communication or persons new in satellite communication technology.
Duration	2 days
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • General good English language skills.
Environment	Classroom
Methods	Lecture, discussion, demonstrations.

2.3 DVB S2 (9245)

Title	9245 - DVB S-2
Level	Advanced / Expert
Objectives	<p>The participant will be able to:</p> <ul style="list-style-type: none"> ▪ Understand feature and benefits of the DVB-S2 Option in SKYWAN 5G networks. ▪ Perform configuration of the SKYWAN IDU, DVB Gateway and Hub router using input from Network Engineering. ▪ Perform monitoring to ensure proper operation of the DVB-S2 links.
Contents	<p>Brief description of SKYWAN DVB solution:</p> <ul style="list-style-type: none"> • DVB-S2 standard • DVB-S2 option in SKYWAN 5G networks <p>SKYWAN specific configuration:</p> <ul style="list-style-type: none"> • DVB Gateway • Hub router • DVB-S2 receiver <p>Monitor & control relevant parameters for operation:</p> <ul style="list-style-type: none"> • Pitfalls & troubleshooting • Monitoring DVB-S2 parameters
Target Group	SKYWAN 5G - Network Operator
Duration	1 day
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • Participation in ND SATCOM course 9240 • Good knowledge in TCP/IP basics • Good knowledge in 'satellite communication fundamentals (VSAT)' • General good English language skills
Environment	SKYWAN 5G hardware, DVB Gateway AT-60, Hub router, PC or notebook with SKYWAN NMS software, inter-cabling of some SKYWAN stations and the DVB Gateway and Hub router for a small network.
Methods	Lecture, hands-on with NMS tools, demonstrations



3 COURSE CERTIFICATE

The ND SATCOM courses will provide a solid knowledge about the selected topic for the participant. Three knowledge levels exist within the available course sequences:

- Entry level (Beginners)
- Basic level (Silver - Specialist)
- Advanced level (Gold - Expert)

Customer will be able to go for:

- Participation in entry / basic / advanced level courses (without test),
- Participation in additional dedicated Expert certification courses.

ND SATCOM provides the standardized certification courses:

- Expert SKYWAN 5G Network Operator,
- Expert SKYWAN 5G Station Commissioner,

or on request:

- Expert SKYWAN 5G Network Designer.

Passing our certification courses guarantees a common and exchangeable base of proven knowledge and skills.

All Expert certificates are valid for **2 years**. Prolongation requires a dedicated and timely re-certification.



Title	Certification as SKYWAN 5G Expert
Objectives	The participant proves in an examination that he has the required knowledge for the corresponding role
Target Group	Persons that <ul style="list-style-type: none"> • need the certificate for skills confirmation • are working at a Valued Partner Program (VPP) company
Duration	1 day
Prerequisites	The following prerequisites are mandatory for the exam participant: <ul style="list-style-type: none"> • sound understanding of SKYWAN product for requested role • Expert SKYWAN Network Operator: <ul style="list-style-type: none"> Course 9240 Network Commissioning & Operations (Basic) Course 9250 Network Commissioning & Operations (Advanced) Course 9245 DVB (optional) • Expert SKYWAN Station Commissioner: <ul style="list-style-type: none"> Course 8010 Installation Basics, or experience with VSAT installation Course 9140 Station Commissioning & Maintenance
Environment	Classroom
Methods	Written test with practical tasks
Certificate	Signed ND SATCOM certificate for named participant
Valid Period	2 years
Renewal	Yes, optional classroom course for updates to latest product releases