


ND SATCOM

// SKYWAN 5G COURSE OVERVIEW //



Premium Satellite Communications
Systems & Solutions

Version: May 2018

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 (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 center in Friedrichshafen. 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 ND SatCom products and solutions.



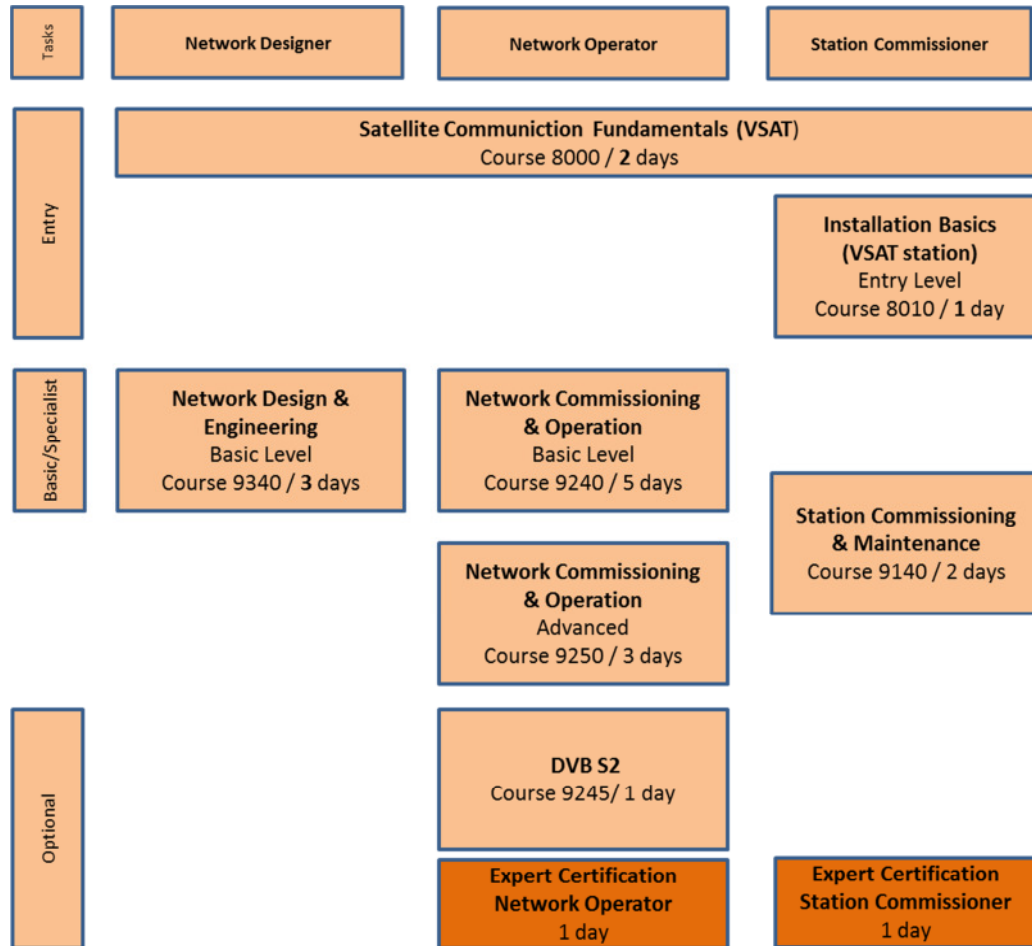
The following training course catalogue is based on the new SKYWAN 5G generation. Detailed descriptions of well-proven predefined courses about SKYWAN are available for review.



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 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.

ND SATCOM

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



The following course descriptions will provide the necessary detailed information about available course modules.

1.1 Station Commissioning (9140)

Title	9140 - SKYWAN 5G Station Commissioning
Level	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 (9250)

Title	9250 - SKYWAN 5G Network Commissioning
Level	Advanced / Expert
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"> • Configure network management relevant parameters, • Monitor & control relevant parameters for proper network operation, • Maintain the required grade of service within the network, • Perform necessary FAT- and NAT-procedures. <p>This course is the mandatory prerequisite for the participation in the additional certification course 'Expert SKYWAN 5G Network Operator'.</p>
Contents	<p>Parameter configuration for certain use cases:</p> <ul style="list-style-type: none"> • Network Configurator (Configuration groups & profiles concept; network planning, profile activation & configuration upload), • Satellite link (Configuration of station; network & master/ backup-master), • Network management parameter (Access control for node- & network management). <p>Acceptance tests:</p> <ul style="list-style-type: none"> • Run FAT procedure, • Run NAT procedure, • Troubleshooting approach. <p>Special configurations:</p> <ul style="list-style-type: none"> • Station & network redundancy, • Hybrid topologies, <p>Configure & optimize user IP-traffic:</p> <ul style="list-style-type: none"> • Quality-of-Service features for IP-traffic, • Advanced router configuration. <p>SKYWAN NMS advanced network tasks:</p> <ul style="list-style-type: none"> • Advanced network adjustments, • Advanced monitoring & additional useful graphs.
Target Group	SKYWAN 5G - Network Operator
Duration	3 days (1 additional day for Expert Certification)
Prerequisites	<p>The following prerequisites are mandatory for the participant:</p> <ul style="list-style-type: none"> • Participation in ND SatCom courses 9240 and 9242, • 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	The participant will have general knowledge about: <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	The following prerequisites are mandatory for the participant: <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	
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 ODG200, 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. The following knowledge levels within the available course sequence are introduced:

- 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 currently the following standardized certification courses ***:

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

By passing our certification courses a common and exchangeable base of proven knowledge and skills will be guaranteed.

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