

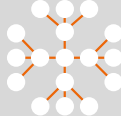
Smallest HUB device on the market



Star



Full Mesh



Multi-Star



Hybrid

DVB-S2

ND SATCOM

SKYWAN 5G

The ONE

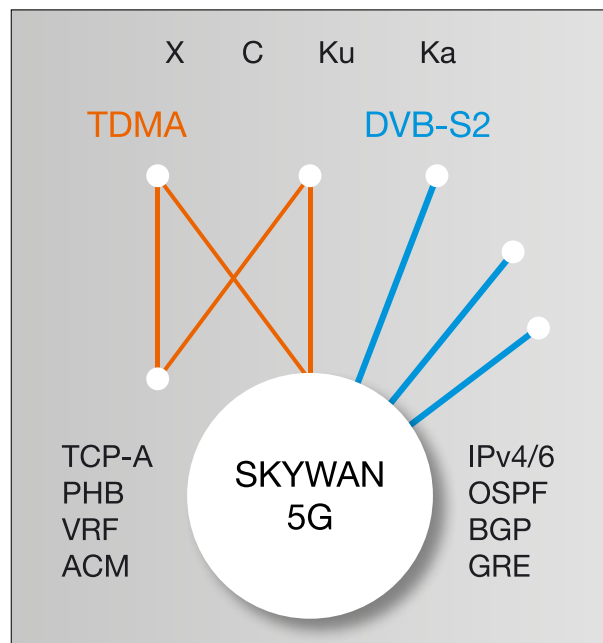
Enabling Agile Networks

ND SatCom's SKYWAN 5G is transforming the way communication networks are created and behave by merging VSAT & comprehensive IT capabilities into a single hardware device. This all-in-one unit has full functionality and only needs to be configured for the network of choice, thus simplifying overall logistics. From adding new sites to handling spare parts, SKYWAN 5G eases the process and helps you make the ONE right choice.

SKYWAN 5G contains a comprehensive router supporting interior & exterior routing protocols and MPLS, thus providing a seamless integration into customer networks. Customers choose which satellite data-transfer method to use: flexibility and network efficiency of MF-TDMA or the spectral efficiency of DVB-S2, both resulting in an optimal use of costly satellite bandwidth. Even though a single 1RU SKYWAN 5G unit is incredibly powerful (140,000 pps), central sites potentially require more performance or more receivers. SKYWAN 5G introduces a game-changing innovation of stackable units, thus increasing performance and scale, such that the whole is more than the sum of each part.

SKYWAN 5G HIGHLIGHTS

- Get all-in-one - the reliable ONE solution
- Gain flexible topology - star to mesh networks
- Gain space & portability - smallest unit available
- Gain powerful performance - with easy interface
- Generate savings - lower cost of ownership



ND SATCOM

GET ALL-IN-ONE

One Multi-Purpose Hardware Platform for Everything

SKYWAN 5G is designed as an all-in-one device with all features on board. Hub, terminal, satellite network control, star, hybrid, mesh, router – whatever the need, every SKYWAN 5G has the capability to implement it. Functions are enabled on-the-fly by means of configuration and license modification in a matter of seconds. Changes are made totally safe thanks to the transaction-based change set, ensuring that the network is always in a consistent state. Operators get assistance for software roll-outs via an automated distribution process thus minimizing effort for maintenance tasks.

SKYWAN 5G introduces the concept of building a stack from single units that together act as a single node. This way, performance or number of receivers is easily extended at any location by keeping the same address scheme.

BENEFIT

- **“ONE DEVICE DOES IT ALL”**
 - Look & Feel is the same, no matter if a hub, or terminal or stacked units
 - Roles (e.g. hub function or satellite network control) can be easily transferred to another location without hardware changes
- **Simplified Logistics**
 - Easy spare parts handling - just one type of hardware in stock
 - Hassle-free documentation and customs process for procurement
 - Design, ordering and calculations are all based on the same hardware
- **Stacking/Cascading**
 - Increase performance of any location without changing schemes
 - Increase inbound capacity
 - Just one SKYWAN 5G unit of a stack is transmitting, no additional backoff required
 - Perfectly suited for "pay as you grow"



1 Rack Unit SKYWAN 5G Hardware for Hub & Terminal

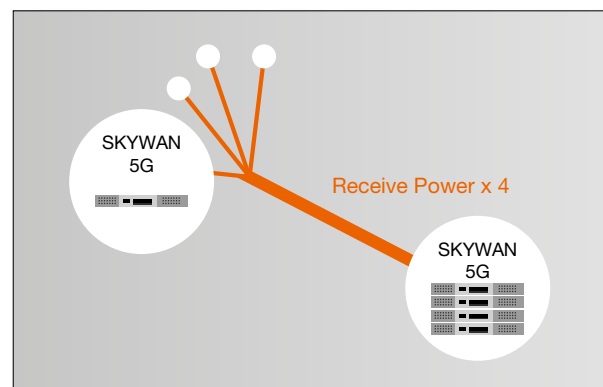
GAIN POWERFUL PERFORMANCE

Cascading: Smart Receiver Upgrade for any Site

Interconnecting SKYWAN 5G to a cascaded stack, as an upgrade for any location, adds a new dimension of advantages in serving customer requirements. While the first SKYWAN 5G acts as prime controller, cascading increases the number of TDMA receivers by adding more units with only the demodulator enabled. Therefore, the whole stack acts as a single node with one station ID and IP address. Of course, multiple stacks can be placed in parallel if needed.

HIGHLIGHTS

- Up to four units per stack for current release
- First SKYWAN 5G is prime controller and single transmitter of the node, therefore no additional ODU backoff is needed. Synchronization and data transfer is done over Ethernet/IP.
- Support of multiple stacks per location using same IP address and separated by Node-ID
- Suitable for any station type (hub, terminal)

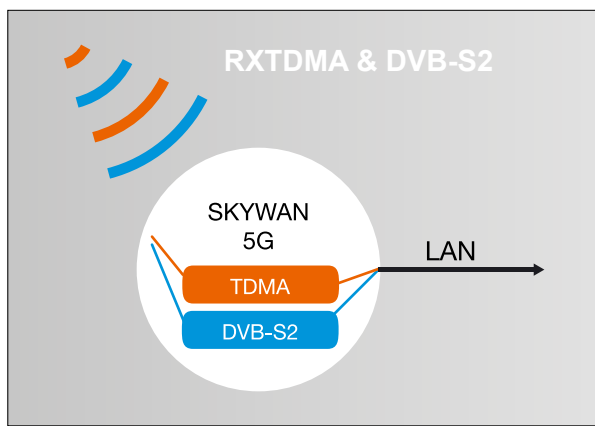


BENEFITS

- Suitable to increase or decrease inbound capacity without interrupting service
- Capacity split to several smaller TDMA channels to connect power-limited remotes or enable mesh if required
- Upscale and downscale RX data rate based on customers' choice for their peak/non-peak periods
- Capacity pooling with more channels enhances TDMA efficiency and further lowers OPEX
- Optimized CAPEX: most economical solution to serve higher inbound bandwidth requirements by adding just a "demodulator"

DUAL DEMODULATOR (DVB-S2 + TDMA)

SKYWAN 5G is a MF-TDMA modem with integrated DVB-S2 receiver. The RX signal is injected to one common Rx port, split up internally and passed to both demodulators (DVB-S2 and TDMA receiver). SKYWAN 5G is unique in, that both traffic types are received simultaneously up to full speed and forwarded by the router without limiting the throughput. The dual demodulator of SKYWAN 5G perfectly supports higher throughput applications where bandwidth management is a pain point by utilizing the TDMA link for configuring ad hoc DVB-S2 links.



For any ad hoc or temporary event (like covering large exhibitions, sports events or providing Internet broadband access) where higher data rates are occasionally needed, both receivers can be independently and dynamically used to fulfill the bandwidth expectations. Customers can easily upscale and downscale RX data rates as they wish for peak/non-peak periods.

With an additional DVB-S2 Modulator installed at a remote site, a customer can immediately establish DVB SCPC links to any other SKYWAN 5G site thanks to the integrated DVB-S2 receiver.

BENEFITS

- Receive simultaneously on TDMA up to 20Mbps & DVB-S2 up to 55Mbps
- High performance router with 140,000 pps switching rate
- TDMA link is utilized to manage DVB-S2 links
- Easily upscale/downscale throughputs for short-term events

SKYWAN 5G is the ONE VSAT platform for service providers that provide flexible TDM/TDMA solutions for their end customers

GENERATE SAVINGS - HIGH EFFICIENCY & PERFORMANCE FOR TRAFFIC CARRIERS

Performance in the DVB-S2 path is up to 55Mbps at LAN port (160Mbps for the complete DVB outbound) and up to 20 Mbps for each TDMA carrier in Rx and Tx. This gives you the assurance to drive high performance throughput networks as expected in a SCPC environment. The SKYWAN 5G modem gives you the flexibility to support more than 24 MODCODs while designing TDMA carriers.

Modem Performance is a critical indicator for the user when making a technology platform decision. We are proud to say that the SKYWAN 5G provides the best bits/Hz efficiency in the TDMA world, Eb/No performance almost at SCPC modem level and high inbound carrier data rates. The modem delivers the highest throughput, not only in DVB/TDM including ACM implementation but also at TDMA level, by supporting higher efficiency 16APSK MODCODs.

BENEFITS

- Enhanced TDMA efficiency, more Bit/Hz by using industry leading 16APSK
- Huge bandwidth savings with application of 16APSK in TDMA and up to 32APSK in DVB
- Reduction in recurring bandwidth cost (OPEX)
- Built-in DVB receiver also reduces CAPEX cost for higher multiple share bandwidth requirements

TDMA

BPSK	QPSK	8PSK	16APSK
R_c	R_c	R_c	R_c
1/3	1/3		
2/5	2/5		
4/9	4/9		
1/2	1/2		
2/3	2/3	2/3	2/3
	3/4	3/4	3/4
	4/5	4/5	4/5
	5/6	5/6	5/6
	6/7	6/7	6/7

DVB-S2

QPSK	8PSK	16APSK	32APSK
R_c	R_c	R_c	R_c
1/4			
1/3			
2/5			
1/2			
3/5	3/5		
2/3	2/3	2/3	
3/4	3/4	3/4	3/4
4/5		4/5	4/5
5/6	5/6	5/6	5/6
8/9	8/9		8/9
9/10	9/10	9/10	9/10

SIGNALING INDEPENDENT FROM DVB

Since the signaling is done via TDMA carriers, temporary or even multiple DVB outbounds in one network are possible.

With every remote having a built-in DVB receiver, this provides flexibility to host DVB outbound from any remote location. In addition, multiple non-redundant DVB outbound channels can be established everywhere on each site (DVB receiver can be reconfigured). Activation of SKYWAN's meshed capability demonstrates the flexibility of the network design.

In general, local redundancy (DVB gateway redundancy via VRRP and SKYWAN IDU) is possible as well as geographical redundancy for DVB outbound in correlation with active master role (the DVB outbound can be active only at the place where the active master is running).

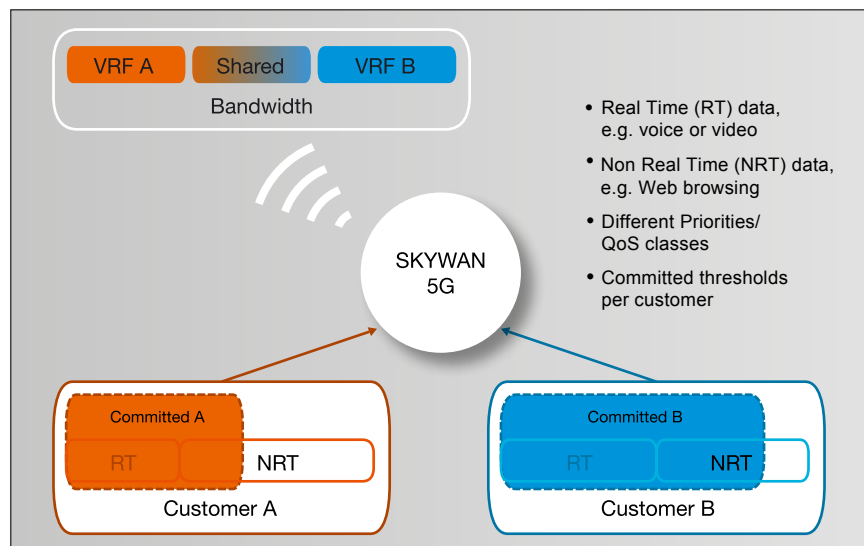
BENEFITS

Multiple DVB outbounds, independent of the site location, can be enabled and supported by the system design.

GAIN RELIABILITY & SAVINGS ACROSS MIXED MARKET REQUIREMENTS SKYWAN 5G Supports Virtual Routing and Forwarding (VRF) in Combination with Multiple QoS Classes Based on PHB

In the SATCOM market, service providers have to support multiple customers in one network to benefit from capacity pooling and therefore optimized OPEX costs (bandwidth). Quite often, the customers are located in different vertical market segments, with different needs in terms of capacity, traffic classes, QoS aspects and IP address ranges, which limits the capability of many VSAT networks. SKYWAN 5G provides the viable solution by offering a Virtual Routing and Forwarding (VRF) concept, where all these needs and requirements can be combined in one physical network.

VRF provides the advantage of implementing networks where multiple customers/departments are involved and the customer groups' networks are kept separated with respect to IP network design, bandwidth allocation and assignment. In addition, different customer-defined terminal groups and multiple customers on one remote station are supported, since the Ethernet port can be configured independently (not only a switch, but a complete router).



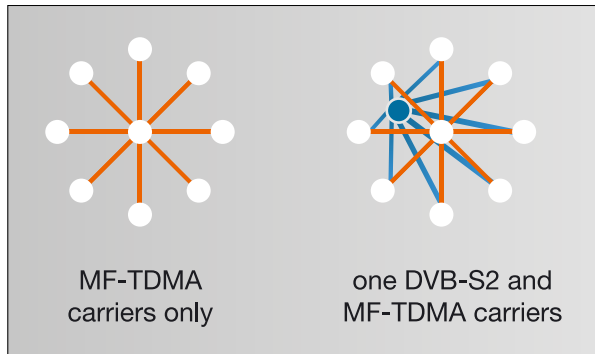
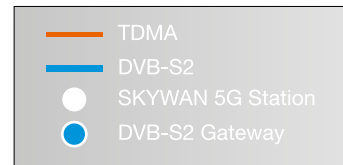
BENEFITS

- Ease of doing business for service providers
- Reduced CAPEX/OPEX by not investing in multiple HUBS for multiple customer
- End user/customer can configure his own network and perform all functions remotely through VNO

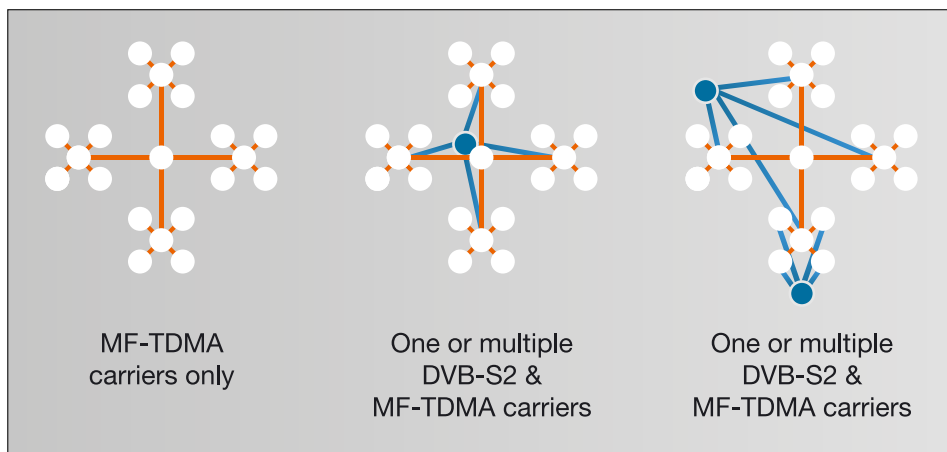
GAIN FLEXIBLE TOPOLOGIES

With one device SKYWAN 5G offers a multitude of possible topologies:

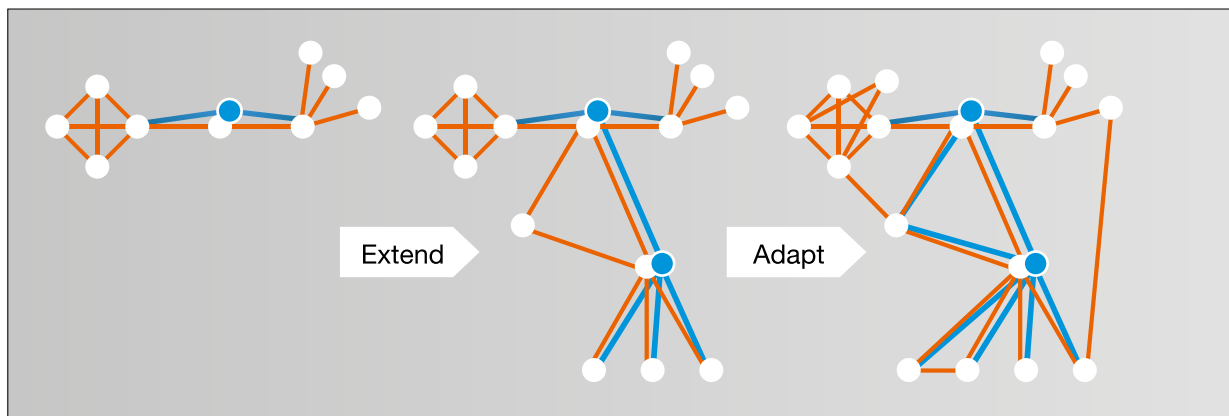
- Star-based systems
 - Based on MF-TDMA carriers only
 - Based on one DVB-S2 and MF-TDMA carriers



- Multi-Star based systems
 - Based on MF-TDMA carriers only
 - Based on multiple DVB-S2 and MF-TDMA carriers



- Hybrid systems
 - Extension of previous networks with several fully meshed terminals
 - Complete fully meshed network (with or without one or several DVB-S2 outbound)



Imagine! You are not only able to mix topologies, but also have different customers with divers requirements within the same system. A service provider can serve different vertical markets where the equipment is hosted at the end customer's HQ or at the service provider facility, backed up by secure VPN connectivity.

EXPLORE EVEN MORE

More SKYWAN 5G advantageous features are:

- Gain space and portability: smallest unit available
- Web browser access
- Pointing assistant
- Network Management System (NMS) delivered as virtual appliances
- User-friendly NMS, transactional configuration, dashboard
- Training/support/attractive bundling

Visit us on our SKYWAN 5G webpage for more information.

www.SKYWAN5G.com



SKYWAN 5G – THE SERVICE PROVIDER’S X FACTOR

HEADQUARTERS

ND SatCom GmbH
Graf-von-Soden-Strasse
88090 Immenstaad
Germany
PHONE: +49 7545 939 0
FAX: +49 7545 939 8780
E-Mail: info@ndsatcom.com

CHINA

ND SatCom (Beijing) Co. Ltd.
Unit 1029, Landmark Tower 2
No. 8 Dongsanhuan Bei Lu,
Chaoyang District
Beijing 100004, China
PHONE: +86 10 6590 6869/6878

MIDDLE EAST

ND SatCom FZE
BA02, South Zone 5
P.O. Box: 261757
Jebel Ali Free Zone
Dubai-United Arab Emirates
T: +97148865012

www.ndsatcom.com

ND SATCOM