COFDM-LINK

Main Features

- Designed for multiple Fixed or Mobile applications
- Quasi Non-Line-Of-Sight (NLOS)
- Robust DVB-T2 modulation
- Bandwidth: 6-7-8MHz
- Bit Rate up to 50Mbps
- Simplex (mono-directional) or Double Simplex (bi-directional) configurations
- Inputs: full IP
- Outputs: selectable over a wide range of interfaces
- Easy setting /monitoring in Local or Remote modes.
- Front Panel Color Display available
- Full SNMP commands available

Product overview

- The COFDM LINK is a 1W RMS, COFDM DVB-T2 based, microwave link, assuring great robustness of operation and extreme signal quality even in non-line-of sigh alignment conditions.
- The COFDM LINK is very flexible and can be configured upon specific customer needs.
- Inputs can be Analogue Audio/Video (optional encoder), ASI or IP with automatic redundancy switch. At receiver side the user can select either ASI , IP or analogue output.
- The RF head is totally frequency agile within frequency sub-bands in the 2-11GHz range and is equipped with low-phase-noise local oscillators, assuring very high signal stability.
- The Modem and the Receiver are housed in a single 19" 1U rack chassis, and are both equipped with a very user-friendly LCD interface.
- A complete remote control of the Modem unit is possible by means of different cabled or wireless telecommunications networks. All parameters can be quickly and easily managed through a remote
- PC connection for a comfortable control and monitoring inside an OB Van or in any other network location by means web browser-based access.
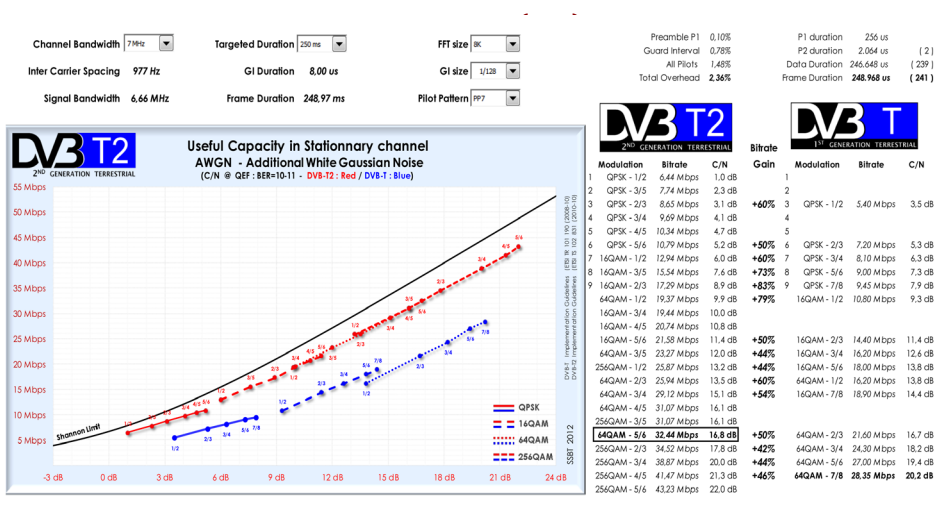

IDU COFDM-LINK | Receiver
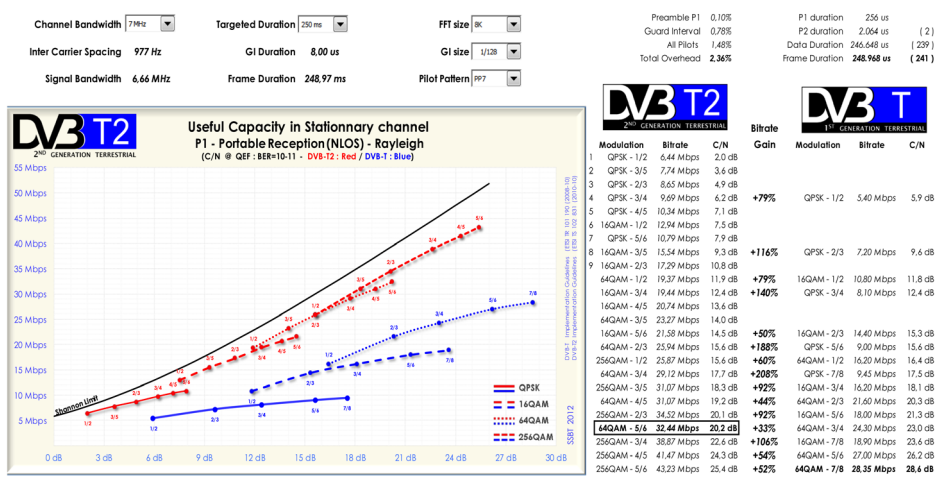

IDU COFDM-LINK | Transmitter

System Description

The COFDM LINK is a brand new equipment specifically designed for for fixed connectivity where LOS is an issue. It brings the legendary reliability and unsurpassed performances of Skylinks MW Radios together with the great Screen Service experience in DVB modulators out and straight in to the live events arena.

Channel Bandwidth	7 MHz		Targeted Duration	250 ms		FFT size	8K	
Inter Carrier Spacing	977 Hz		GI Duration	8,00 us		GI size	1/128	
Signal Bandwidth	6,66 MHz		Frame Duration	248,97 ms		Pilot Pattern	PP7	

Preamble P1	0,10%		P1 duration	256 us	
Guard Interval	0,78%		P2 duration	2.064 us	(2)
All Pilots	1,48%		Data Duration	246.648 us	(239)
Total Overhead	2,36%		Frame Duration	248.968 us	(241)

Useful Capacity in Stationnary channel — AWGN - Additional White Gaussian Noise (C/N @ QEF : BER=10-11 - DVB-T2 : Red / DVB-T : Blue)

	DVB T2 Modulation	Bitrate	C/N	Bitrate Gain		DVB T Modulation	Bitrate	C/N
1	QPSK - 1/2	6,44 Mbps	1,0 dB		1			
2	QPSK - 3/5	7,74 Mbps	2,3 dB		2			
3	QPSK - 2/3	8,65 Mbps	3,1 dB	+60%	3	QPSK - 1/2	5,40 Mbps	3.5 dB
4	QPSK - 3/4	9,69 Mbps	4,1 dB		4			
5	QPSK - 4/5	10,34 Mbps	4,7 dB		5			
6	QPSK - 5/6	10,79 Mbps	5,2 dB	+50%	6	QPSK - 2/3	7,20 Mbps	5.3 dB
7	16QAM - 1/2	12,94 Mbps	6,0 dB	+60%	7	QPSK - 3/4	8,10 Mbps	6.3 dB
8	16QAM - 3/5	15,54 Mbps	7,6 dB	+73%	8	QPSK - 5/6	9,00 Mbps	7,3 dB
9	16QAM - 2/3	17,29 Mbps	8,9 dB	+83%	9	QPSK - 7/8	9,45 Mbps	7,9 dB
	64QAM - 1/2	19,37 Mbps	9,9 dB	+79%		16QAM - 1/2	10,80 Mbps	9,3 dB
	16QAM - 3/4	19,44 Mbps	10,0 dB					
	16QAM - 4/5	20,74 Mbps	10,8 dB					
	16QAM - 5/6	21,58 Mbps	11,4 dB	+50%		16QAM - 2/3	14,40 Mbps	11,4 dB
	64QAM - 3/5	23,27 Mbps	12,0 dB	+44%		16QAM - 3/4	16,20 Mbps	12,6 dB
	256QAM - 1/2	25,87 Mbps	13,2 dB	+44%		16QAM - 5/6	18,00 Mbps	13,8 dB
	64QAM - 2/3	25,94 Mbps	13,5 dB	+60%		64QAM - 1/2	16,20 Mbps	13,8 dB
	64QAM - 3/4	29,12 Mbps	15,1 dB	+54%		16QAM - 7/8	18,90 Mbps	14,4 dB
	64QAM - 4/5	31,07 Mbps	16,1 dB					
	256QAM - 3/5	31,07 Mbps	16,1 dB					
	64QAM - 5/6	**32,44 Mbps**	**16,8 dB**	**+50%**		64QAM - 2/3	21,60 Mbps	16,7 dB
	256QAM - 2/3	34,52 Mbps	17,8 dB	+42%		64QAM - 3/4	24,30 Mbps	18,2 dB
	256QAM - 3/4	38,87 Mbps	20,0 dB	+44%		64QAM - 5/6	27,00 Mbps	19,4 dB
	256QAM - 4/5	41,47 Mbps	21,3 dB	+46%		**64QAM - 7/8**	**28,35 Mbps**	**20,2 dB**
	256QAM - 5/6	43,23 Mbps	22,0 dB					

Comparison with normal DVB–T radio link available on the market (limited to 28Mbps)

Bit Rate value vs. BW and modulation scheme (NLOS)

Channel Bandwidth	7 MHz		Targeted Duration	250 ms		FFT size	8K	
Inter Carrier Spacing	977 Hz		GI Duration	8,00 us		GI size	1/128	
Signal Bandwidth	6,66 MHz		Frame Duration	248,97 ms		Pilot Pattern	PP7	

Preamble P1	0,10%		P1 duration	256 us	
Guard Interval	0,78%		P2 duration	2.064 us	(2)
All Pilots	1,48%		Data Duration	246.648 us	(239)
Total Overhead	2,36%		Frame Duration	248.968 us	(241)

Useful Capacity in Stationnary channel — P1 - Portable Reception (NLOS) - Rayleigh (C/N @ QEF : BER=10-11 - DVB-T2 : Red / DVB-T : Blue)

	DVB T2 Modulation	Bitrate	C/N	Bitrate Gain		DVB T Modulation	Bitrate	C/N
1	QPSK - 1/2	6,44 Mbps	2,0 dB		1			
2	QPSK - 3/5	7,74 Mbps	3,6 dB		2			
3	QPSK - 2/3	8,65 Mbps	4,9 dB		3			
4	QPSK - 3/4	9,69 Mbps	6,2 dB	+79%	4	QPSK - 1/2	5,40 Mbps	5,9 dB
5	QPSK - 4/5	10,34 Mbps	7,1 dB		5			
6	16QAM - 1/2	12,94 Mbps	7,5 dB		6			
7	QPSK - 5/6	10,79 Mbps	7,9 dB		7			
8	16QAM - 3/5	15,54 Mbps	9,3 dB	+116%	8	QPSK - 2/3	7,20 Mbps	9,6 dB
9	16QAM - 2/3	17,29 Mbps	10,8 dB		9			
	64QAM - 1/2	19,37 Mbps	11,9 dB	+79%		16QAM - 1/2	10,80 Mbps	11,8 dB
	16QAM - 3/4	19,44 Mbps	12,4 dB	+140%		QPSK - 3/4	8,10 Mbps	12,4 dB
	16QAM - 4/5	20,74 Mbps	13,6 dB					
	64QAM - 3/5	23,27 Mbps	14,0 dB					
	16QAM - 5/6	21,58 Mbps	14,5 dB	+50%		16QAM - 2/3	14,40 Mbps	15,3 dB
	64QAM - 2/3	25,94 Mbps	15,6 dB	+188%		QPSK - 5/6	9,00 Mbps	15,6 dB
	256QAM - 1/2	25,87 Mbps	15,6 dB	+60%		64QAM - 1/2	16,20 Mbps	16,4 dB
	64QAM - 3/4	29,12 Mbps	17,7 dB	+208%		QPSK - 7/8	9,45 Mbps	17,5 dB
	256QAM - 3/5	31,07 Mbps	18,3 dB	+92%		16QAM - 3/4	16,20 Mbps	18,1 dB
	64QAM - 4/5	31,07 Mbps	19,2 dB	+44%		64QAM - 2/3	21,60 Mbps	20,3 dB
	256QAM - 2/3	34,52 Mbps	20,1 dB	+92%		16QAM - 5/6	18,00 Mbps	21,3 dB
	64QAM - 5/6	**32,44 Mbps**	**20,2 dB**	**+33%**		64QAM - 3/4	24,30 Mbps	23,0 dB
	256QAM - 3/4	38,87 Mbps	22,6 dB	+106%		16QAM - 7/8	18,90 Mbps	23,6 dB
	256QAM - 4/5	41,47 Mbps	24,3 dB	+54%		64QAM - 5/6	27,00 Mbps	26,2 dB
	256QAM - 5/6	43,23 Mbps	25,4 dB	+52%		**64QAM - 7/8**	**28,35 Mbps**	**28,6 dB**

Comparison with normal DVB–T radio link available on the market (limited to 28Mbps)

System Components – ODU

MAIN FEATURES

- High Linearity allowing highest order modulation schemes.
- Very low power consumption.
- Compact and Lightweight.
- Very low Phase Noise.
- Superior reliability - High MTBF.
- Fully Calibrated over the temperature range.
- Telemetry Interface.
- Antenna direct mount (optional N type connector)

FREQUENCIES

- Most popular/recommended 6,6-7,5GHz (e.g. Brasilian band 6.650-7410MHz). Other bands on demand 2-11GHz

ODU PARAMETERS

- TX output power: Max +30dBm at QPSK - 30dB dynamic range.
- RX Threshold: (at 64QAM/33Mbps) -80dBm
- Modulation: COFDM – DVB-T2
- CH BW 6 -7- 8MHz

The following Table shows indicative distances reachable for 33Mbps at 64QAM for an availability >99,99%:

Freq. (GHz)	Dish Diam. (m.)	Pw Output (dBm)	Distance (Km.)
2	0,6	+26	25
6 - 7	0,6	+24	30
10	0,6	+22	25

Examples on Line-of-Sight link conditions.

OTHER OPTIONS

- Omni directional and sectorial RX antenna
- Panoramic central receiving station.

Sky **links** ᴍᴡ

System Components – IDU TX

Indoor Unit Modem

Description

The digital modem encloses in a 1-unit rack the best of what is available on the market regarding flexibility and performance. The COFDM-LINK equipped with different input/output data interfaces (DVB-ASI, ASI over IP), can tolerate heavy selective fading distortions;

- R1U chassis
- Standard system solutions for 1+0 mono-directional
- Inputs : 4 ASI or IP
- Modulations: from QPSK to 256QAM
- Capacity: up to 50 Mbps
- Local or Remote setting and operation

Options

- Encoder Inputs SDI o CVBS
- Low latency
Bi-directional (composed by 1 full-duplex ODU + 1 Modem and 1 Receiver each terminal)

System Components – IDU RX

Indoor DeMdem

Description

The COFDM-LINK RX receives a RF signal modulated with standard ETSI EN 302755 or ETSI EN 300744, demodulated and output it. Very high efficiency Forward Error Corrections (LDPC + BCH).

RX Outputs

- **SD–SDI**: N° Outputs: 2 Connector: BNC, R Input: 75 Ohm, V Input: 800 mVpp (500 to 1200 mVpp); Standard: SMPTE 259M, 292M
- **Audio:** N° Outputs: 2 (Left + Right) Connector: mini XLR
- **RGB–SD**: N° Outputs: 1x3 (R, G, B) Analog component HD; Connector: RCA
- **CVBS–SD**: N° Outputs: 1 Composite Video Blanking Sync; Connector: RCA
- **Y/Pb/Pr**: N° Outputs: 1x3 (Y Pb Pr) Analog component HD; Connector: RCA,
- **HDMI (HD/SD)**: N° Outputs: 1 Connectors: HDMI Type A
- **ASI N° output: 3**
- TS Descrambled (TSD)
- Connector type: BNC
- R input: 75 ohm - V input: 800 mVpp (500 to 1200mVpp) - MPEG-2 TS ISO/IEC 13818-1
- CEI EN 50083-9
- **Video over IP**: Connector type: Ethernet RJ45; Standard SMPTE 2022