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Data Sheet: MTF LEO Satellite Systems

Description	DownLink	UpLink
Tx Power	51dBm/Beam	38dBm
Bit Rate	100Mbps/User	5Mbps/User
# of Users	128 Users/Beam	128 Users/Beam
Tx Antenna Gain	30dBi	18dBi
Tx Antenna Type	16X16 AESA, π lobe	4X4 PESA, π lobe
Rx Antenna Gain	18dBi	30dBi
Rx Antenna Type	4X4 PESA, π lobe	16X16 AESA, π lobe
Rooftop Loss	0dB	0dB
Range	600Km	600Km
Modulation	MTFM™	MTF™
Coding Gain	0dB	0dB
Tx/Rx H/W	Apart	Integrated
Carrier Frequency	3.5GHz	3.5GHz
BW	10MHz	10MHz
Sampling Type	RF	RF
ADC	Dual: 7GHz @ 4bit/sample	Dual: 7GHz @ 4bit/sample
PAPR	0dB	11dB
MAC	MTFMA™ with Dynamic Channel Allocation	
Multiple Access	Point-to-Multipoint	Multipoint-to-Point

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Data Sheet: Existing LEO Satellite Systems

Description	DownLink	UpLink
Tx Power	51dBm/Beam	38dBm/Satellite
Bit Rate	100Mbps/User	5Mbps/User
# of Users	128 Users/Beam	128 Users/Beam
Tx Antenna Gain	30dBi	18dBi
Tx Antenna Type	16X16 AESA, π lobe	4X4 PESA, π lobe
Rx Antenna Gain	18dBi	30dBi
Rx Antenna Type	4X4 PESA, π lobe	16X16 AESA, π lobe
Rooftop Loss	0dB	0dB
Range	100Km	22.5Km
Modulation	16QAM	16QAM
Coding Gain	9dB	9dB
Tx/Rx H/W	Apart	Integrated
Carrier Frequency	Ku/Ka	Ku/Ka
BW	3.5GHz	3.5GHz
Sampling Type	IF	IF
ADC	Dual: 3.5GHz @ 8bit/sample	Dual: 3.5GHz @ 8bit/sample
PAPR	6dB	6dB
MAC	TDD	
Multiple Access	Point-to-Multipoint	Multipoint-to-Point

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Comparison: MTF LEO Systems Versus Existing LEO Systems

For a fixed Tx power, bit rate, antenna gain and types, the MTF systems offer 3 types of advantages compared to existing systems:

1. The bandwidth is reduced from for current LEO systems to for MTF LEO systems.
2. The range is increased from for current LEO systems to for MTF LEO systems.
3. The complexity for current LEO systems is substantially reduced for MTF LEO systems as shown below:
   a. The Up-Converters/Down-Converters are not required for MTF LEO systems.
   b. The Forward Error Correction (FEC) Encoders are not required for MTF LEO systems.
   c. The resolution of the ADC is smaller for MTF LEO systems.
   d. The PA in the downlink for MTF LEO systems is selected to be highly efficient.

Assumptions:

1. For a LEO satellite, Tx and Rx are separated such that Full Duplex communications is possible for both current LEO systems and MTF LEO systems, while for an earth-based transceiver, Tx and Rx and integrated.
2. The earth-based LEO transceiver is installed on the rooftop of a house/building.
3. Each array element in both Tx and Rx antennas has a steradian lobe.