



LMR Backhaul

mimomax

		P25		DMR		Analog*
Bandwidth	Modulation	No. of Channels	Residual BW	No. of Channels	Residual BW	No. of Channels
75kHz	QAM256	32 Channels	130 kbps	45 Channels	184 kbps	6 Channels
	QAM64	26 Channels	108 kbps	35 Channels	138 kbps	6 Channels
	QAM16	20 Channels	104 kbps	25 Channels	110 kbps	6 Channels
	QPSK	10 Channels	91 kbps	15 Channels	62 kbps	4 Channels
50kHz	QAM256	25 Channels	58 kbps	30 Channels	138 kbps	6 Channels
	QAM64	18 Channels	149 kbps	25 Channels	92 kbps	6 Channels
	QAM16	12 Channels	126 kbps	15 Channels	119 kbps	6 Channels
	QPSK	5 Channels	74 kbps	8 Channels	53 kbps	6 Channels
25kHz	QAM256	10 Channels	154 kbps	13 Channels	143 kbps	6 Channels
	QAM64	8 Channels	111 kbps	11 Channels	95 kbps	5 Channels
	QAM16	5 Channels	78 kbps	7 Channels	65 kbps	3 Channels
	QPSK	2 Channels	44 kbps	3 Channels	35 kbps	1 Channels (with E&M) 2 Channels (no E&M)
12.5kHz	QAM256	5 Channels	77 kbps	7 Channels	64 kbps	3 Channels
	QAM64	4 Channels	55 kbps	5 Channels	49 kbps	2 Channels
	QAM16	2 Channels	44 kbps	3 Channels	35 kbps	1 Channels (with E&M) 2 Channels (no E&M)
	QPSK	N/A	N/A	1 Channels	19 kbps	1 Channels (no E&M)

Capacity

Raw Aggregate Data Rates

Modulation	12.5kHz	25kHz	50kHz	75kHz
QPSK	80 kbps	160 kbps	320kbps	480 kbps
QAM16	160 kbps	320 kbps	640 kbps	960 kbps
QAM64	240 kbps	480 kbps	960 kbps	1440 kbps
QAM256	320 kbps	640 kbps	1280 kbps	1920 kbps

Sensitivity for Data Rates (10^{-6})

Modulation	12.5kHz	25kHz	50kHz	75kHz
QPSK	-144.5 dBm	-111.5 dBm	-108.5 dBm	-106.5 dBm
QAM16	-108 dBm	-105 dBm	-102 dBm	-100 dBm
QAM64	-102 dBm	-99 dBm	-96 dBm	-94 dBm
QAM256	-94.5 dBm	-92 dBm	-89.5 dBm	-87.5 dBm

Mimomax vs Competitor

****SPECIFICATIONS TAKEN FROM ON-LINE PRODUCT SHEETS****

	12.5 kHz		25 kHz		50 kHz		75 kHz	100 kHz
	Mimomax	Competition (4RF,GE,etc.)	Mimomax	Competition (4RF,GE,etc.)	Mimomax	Competition (4RF,GE,etc.)	Mimomax	Competition (4RF,GE,etc.)
QPSK	40 kb/s	18-23 kb/s	80 kb/s	32-40 kb/s	160 kb/s	71-80 kb/s	240 kb/s	+/- 134 kb/s
QAM16	80 kb/s	36-45 kb/s	160 kb/s	64-80 kb/s	320 kb/s	137-160 kb/s	480 kb/s	+/- 267 kb/s
QAM64	120 kb/s	54-60 kb/s	240 kb/s	96-120 kb/s	480 kb/s	216-240 kb/s	720 kb/s	+/- 400 kb/s
QAM256	160 kb/s	+/- 80 kb/s	320 kb/s	+/- 160 kb/s	640 kb/s	+/- 320 kb/s	960 kbps	+/- 576 kb/s

- **Modulation** – Highest modulation rate in the narrowband market
- **Capacity** – 2.6x that of the nearest narrowband providers within a bandwidth channel
- **Full Duplex** – Mimomax total capacity can reach 5x any other narrowband providers

Latency, Over-the-air, One way (ms)

IP Latency Table

Note: rates for one way traffic, lightly loaded (64 bytes)

Modulation	12.5kHz	25kHz	50kHz	75kHz
QPSK	35	17.5	9.1	6.5
16QAM	24	12	6.15	4.1
64QAM	16	8	4.4	3.6
256QAM	13	6.5	3.7	2.95

Analog Latency Table

Modulation	12.5kHz	25kHz	50kHz
QPSK	N/A	15	11
16QAM	17	12	9
64QAM	15	10	8
256QAM	14	10	8

Latency

Sync Serial Latency Table, One way (ms)

Bandwidth	Modulation	X21 64kbps	X21 128kbps	X21 192kbps	X21 256kbps	RS422 64kbps	RS422 128kbps	RS422 192kbps	RS422 256kbps	C37.94	G703
75 kHz	QPSK	3.2	3.1	3.0	-	3.2	3.1	3.0	-	3.3	3.5
	QAM16	2.0	1.9	1.9	1.8	2.0	1.9	1.9	1.8	2.2	2.4
	QAM64	1.7	1.5	1.5	1.5	1.7	1.5	1.5	1.5	1.9	2.1
	QAM256	1.5	1.3	1.3	1.3	1.5	1.3	1.3	1.3	1.6	1.6
50kHz	QPSK	4.6	4.5	-	-	4.4	4.5	-	-	5.3	5.2
	16QAM	2.9	2.8	2.8	2.7	3.0	2.8	2.6	2.7	3.7	3.5
	64QAM	2.4	2.2	2.2	2.2	2.3	2.2	2.2	2.2	3.1	2.9
	256QAM	2.1	1.9	1.9	1.9	2.2	1.9	1.9	1.8	2.7	2.6
25kHz	QPSK	9.0	-	-	-	9.0	-	-	-	9.5	9.5
	16QAM	5.5	5.0	-	-	5.5	5.0	-	-	5.9	5.9
	64QAM	4.5	4.4	4.2	-	4.5	4.4	4.2	-	4.8	4.8
	256QAM	4.0	3.8	3.6	3.6	4.0	3.8	3.6	3.6	4.3	4.3
12.5kHz	QPSK	-	-	-	-	-	-	-	-	-	-
	16QAM	10.7	-	-	-	10.7	-	-	-	11.0	11.0
	64QAM	8.0	-	-	-	8.0	-	-	-	9.0	9.0
	256QAM	7.5	7.2	-	-	7.5	7.2	-	-	8.0	8.0

Value Proposition

For Dealer:

- Significant cost-competitive offering to end customers
- Highest capacity in narrowband market
- Proven platform, supporting over 1000 links worldwide
- Easy to deploy and to support

For End Customer:

- Lower cost solutions with more added value = better ROI
- **Capacity** - higher data throughput in narrowband market
- **Speed** - latency rates for voice sit well below 10ms
- **Coverage** - performs well even in non-line-of-sight deployments and across difficult terrain
- **Cost-effective** use of spare 25 or 50 kHz channels of existing licenses
- **Rapid deployment** – ability to utilize existing infrastructure

Mimomax Point-To-Point Advantages

Mimomax can offer a 5 Nines Mission Critical, highly efficient solution with ultra low latency in a licensed narrowband product.

- **Cheaper solution** to install/maintain than licensed microwave
- **Easier to install** than conventional licensed microwave or fibre
- **Less tower loading** - use dual polarised panel antenna and 2 runs of coax
- **Does not require line of sight** like conventional microwave
- **More cost-effective** for last mile communications than fibre or microwave
- **LMR Backhaul Capacity** – highest data throughput in narrowband
- **Licensed** for security & reliability under pressure



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