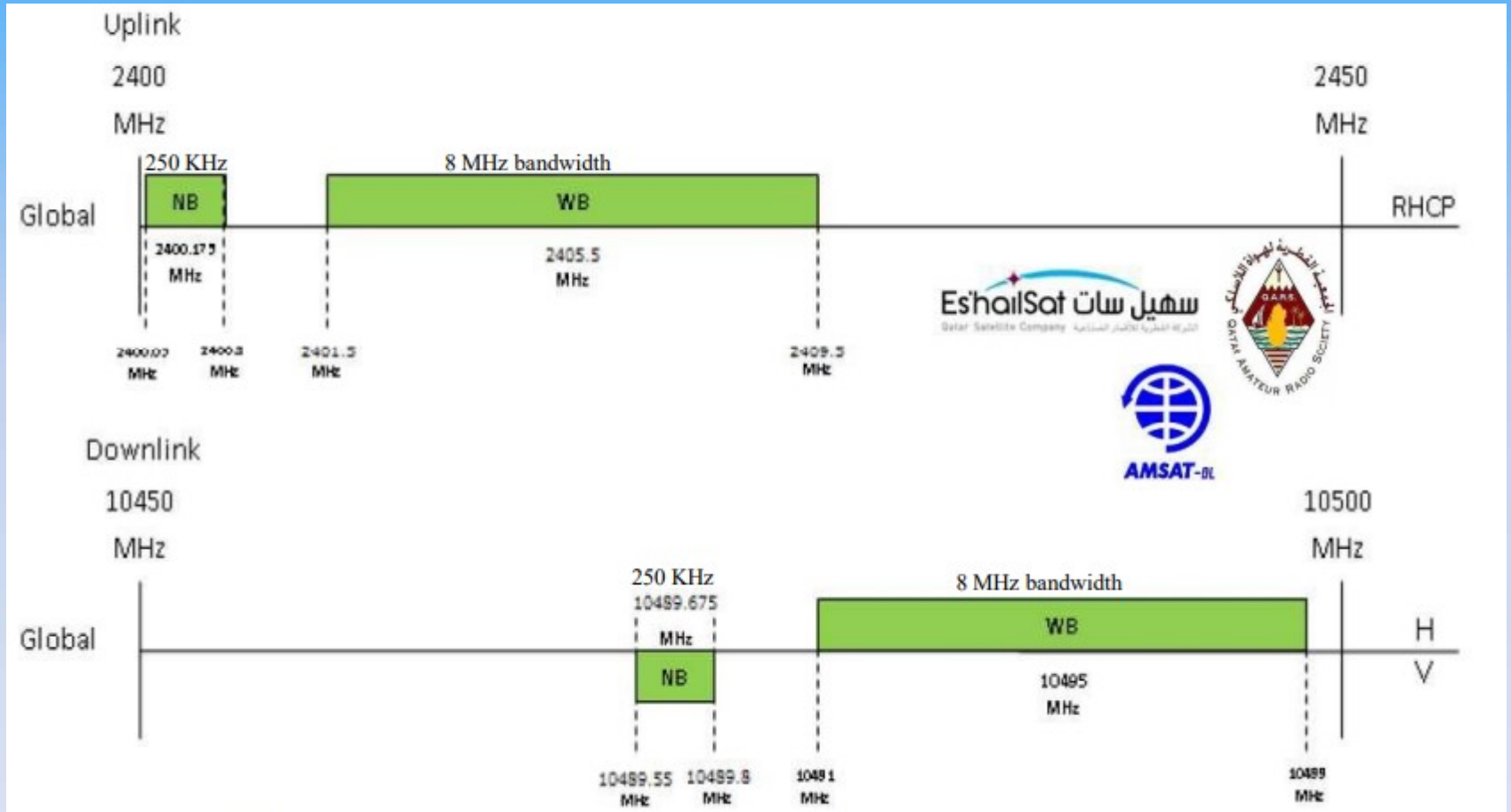
Es’hail 2 Update

Topics

- Frequencies
- Transmission Modes
- Coordination

Es'hail-2 Frequencies

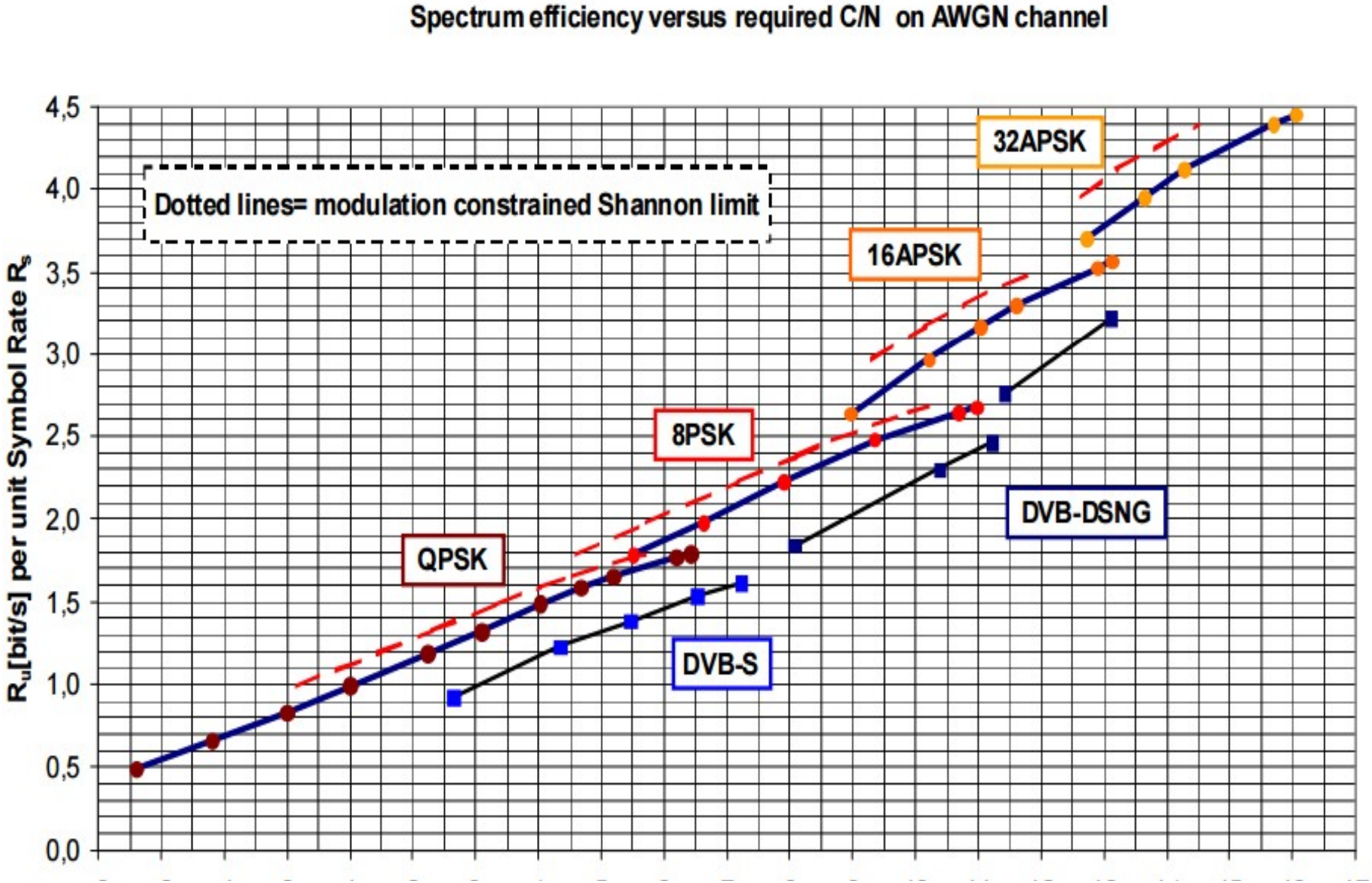


Xpdr	U/L FREQUENCY (MHz)				D/L FREQUENCY (MHz)				LO	BW
No	Pol	Begin	Center	End	Pol	Begin	Center	End	(MHz)	(MHz)
NB	RHCP	2400.05	2400.175	2400.3	V	10489.55	10489.675	10489.8	8089.5	0.25
WB	RHCP	2401.5	2405.5	2409.5	H	10491	10495	10499	8089.5	8

Transmission Modes

- Es'Hail-2 wideband is an " 8 MHz bent pipe" transponder
- There are many potential modes and uses by the amateur TV community
  - Two standards: DVB-S and DVB-S2
  - Four Modulations: QPSK, 8PSK, 16APSK and 32APSK
  - Eleven error corrections (eg 1/2 7/8)
  - Variable Symbol Rate
  - Three video encoders: MPEG-2, H264 and H265
  - 2-way QSOs or broadcasts
- Occupied bandwidths can be 200 KHz – 8 MHz
- Most in-use amateur equipment currently only supports DVB-S QPSK

TV Modulations



Uplink Budget

- Starting point is that an 8 MHz of DVB-S2 transmission requires 100W into a 2.4m dish

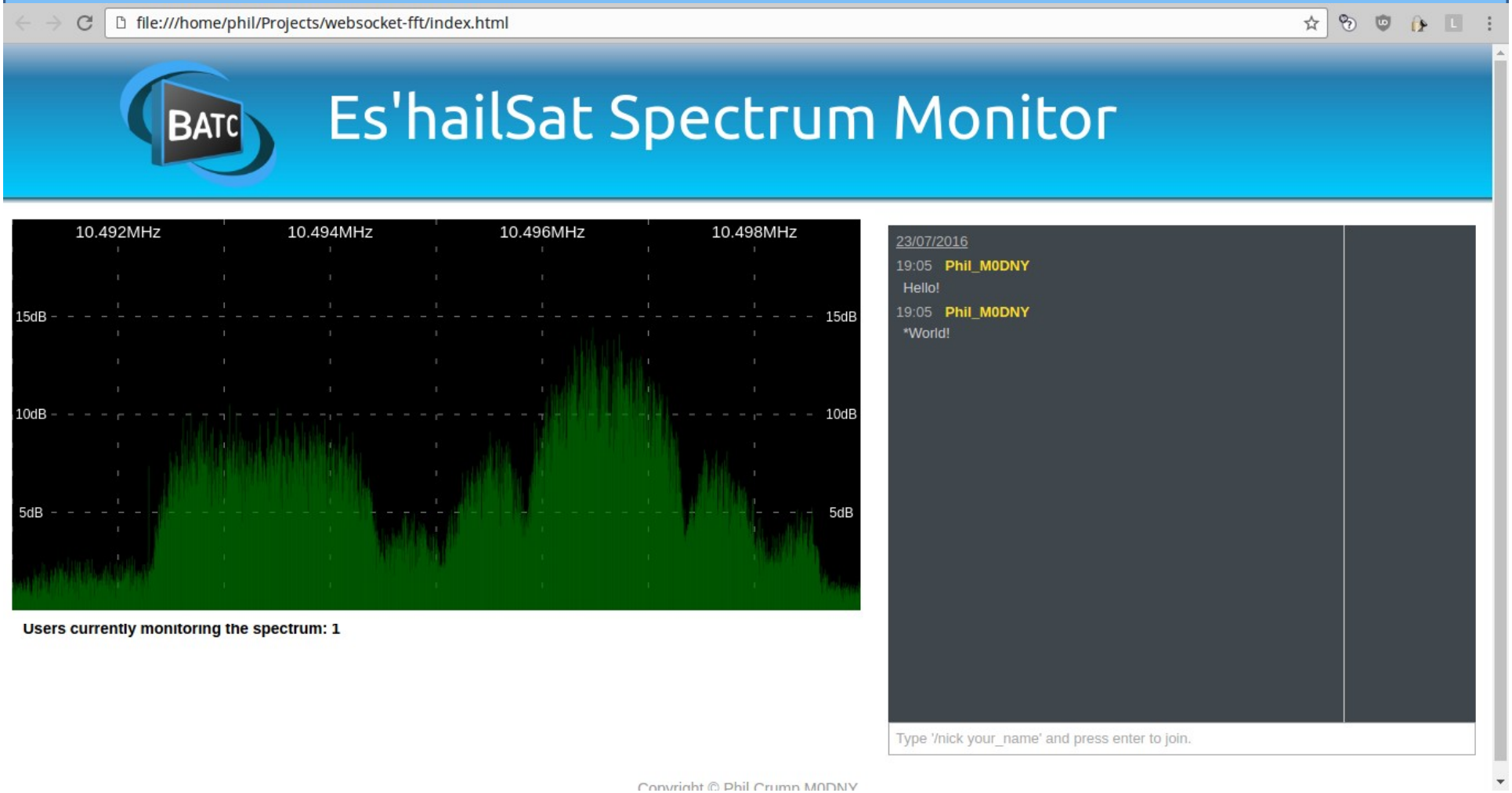
Power Budget (Watts)					
	8 MHz	4 MHz	2 MHz	1 MHz	0.5MHz
2.4m	100	50	25	12.5	6.25
1.7m	200	100	50	25	12.5
1.2m	400	200	100	50	25
0.85m	800	400	200	100	50

Credit M0DTS

Choice and Coordination

- We should encourage and allow experimentation as well as the standard QSO operation
- DATV receivers need to know basic info about the signal they are receiving
  - Modulation, symbol rate and possibly FEC
- With so many modes and bandwidth combinations possible simultaneously we need co-ordination
- BATC Ground station will be a web-based monitor and analysis tool
  - Possible real time signal parameter analysis
  - Will include a chat window for questions
  - Seen as an essential tool to enable the Wide Band transponder usage

BATC Spectrum Monitor



BATC Ground Station

- Located at Goonhilly Earth Station
  - Quiet secure location (IO70JB)
  - Dedicated Receive dish not a problem
  - Excellent network connectivity
- Based around Airspy = 10 MHz bandwidth
- Site supported by a Linode VPS
  - No capacity issues
  - Designed and hosted by BATC

DVB-S2 equipment

- BATC now fully supports the use of DVB-S2
- SR Systems market a full range of DVB-S2 products
- Homebrew or cheaper options include:
- Transmit:
  - DATV Express with Linux Software
  - DATV Express with Windows software
  - BATC Portsdown with Lime SDR Mini
- Receive
  - Up-converter into HD Domestic Receiver (SR > 1MS)
  - MiniTiouner and latest software (QPSK/8PSK FEC ½)

Reception

- Downlink power levels should enable use of fixed 80cm dish in most areas ☺
- Downlink frequency at 10,491 – 10,499 MHz is within pass band of standard consumer LNB ☺
- PLL LNBs must be used to give stability for RB-TV below 1 Msymbol/sec
  - Octagon PLL LNB = £25 on ebay
- However 9,750 MHz LO puts IF outside consumer set top box tuning ☹
  - Standard STB range = 950 – 2,150 MHz
  - 10,491 MHz – 9,750 MHz = 741 MHz

TX Option 1: Up-convert

- Generate DATV signal at lower frequency and up convert - possibly from 437 MHz?
  - Use standard encoder/modulator
  - SR systems, DTX1, DigiLite or ex-broadcast
- Up-converter options:
  - Use narrow-band 13cms up-converter
    - 80 MHz away from 13cms terrestrial NB section
  - Kuhne KU UP 2325 A up-converter
    - Eur500

TX Option 2: 2400 Mhz

- DATV Express
  - Very flexible but requires PC etc
- Modified DTX1
  - Standalone system

- Portsdown with Lime SDR Mini
- All solutions are low power (0 – 10 dBm) and will require extensive amplification and filtering

Launch Date

- Speculation is not helpful
- None of the on-line predictions appear to be based on fact
- Likely to be this year
- AMSAT Transponder Commissioning likely to be at least few months after launch

What to do

- Prepare your transmitter and receiver
- Test it terrestrially
- Be patient

Questions?