

Applying Computers to Smarten Up Your Amateur Radio Hobby



Joseph Kasser, G3ZCZ/VK5WU

<http://therightrequirement.com>

Rev 1.3



Topics

- Conventional amateur radio
- Introduction of computers
- OSCAR
- Digital communications
- Automating Communications
- The Internet
- The future?
- Concerns
- Discussion



State of art 1981



Conventional amateur radio

- Communicating
 - Rag chews
 - Contests
 - Chasing DX
- Experimenting
 - Hardware and software
 - Contests
- Record keeping
 - Logs
 - Awards



Introduction of computers

- **Logging**
- **Packet radio**
 - Copy of the Internet
 - Messages and bulletins
 - APRS
- **DX alerts**
- **Contests**
- **Award records**
- **Propagation predictions**
- **SSTV**



AMSAT Lab 1981



Logs

DATE	TIME	BAND	CALL	RX	TX	MODE	POWER	S	R	COMMENTS
2001/09/10	1217	15	RU3QW	599	559	PSK31	100	-	-	quick qso poor copy
2001/09/10	1315	20	PAQJR	449	479	PSK31	100	-	-	poor copy lost him
2001/09/12	1047	20	JA4IQR	599	599	PSK31	100	-	-	Yoo, Okayama
2001/09/12	1109	20	JA2EX	599	599	PSK31	100	-	-	Miz, PM85
2001/09/12	1119	20	W3GQ	569	599	PSK31	100	-	-	Paul
2001/09/12	1145	20	FR5HA	599	599	PSK31	100	-	-	Jose AF16 St Louis
2001/09/12	1219	20	KG4FJ	599	599	PSK31	100	-	-	Ronni- not sure of c
2001/09/12	1225	20	K5EJ	599	599	PSK31	100	-	-	EJ EM45
2001/09/12	1243	20	DS1KVP	599	599	PSK31	100	-	-	Seoul
2001/09/12	1255	20	W5RIB	599	599	PSK31	100	-	-	Paul
2001/09/12	1316	20	K6BRD	457	599	PSK31	100	-	-	John Pinetop AZ

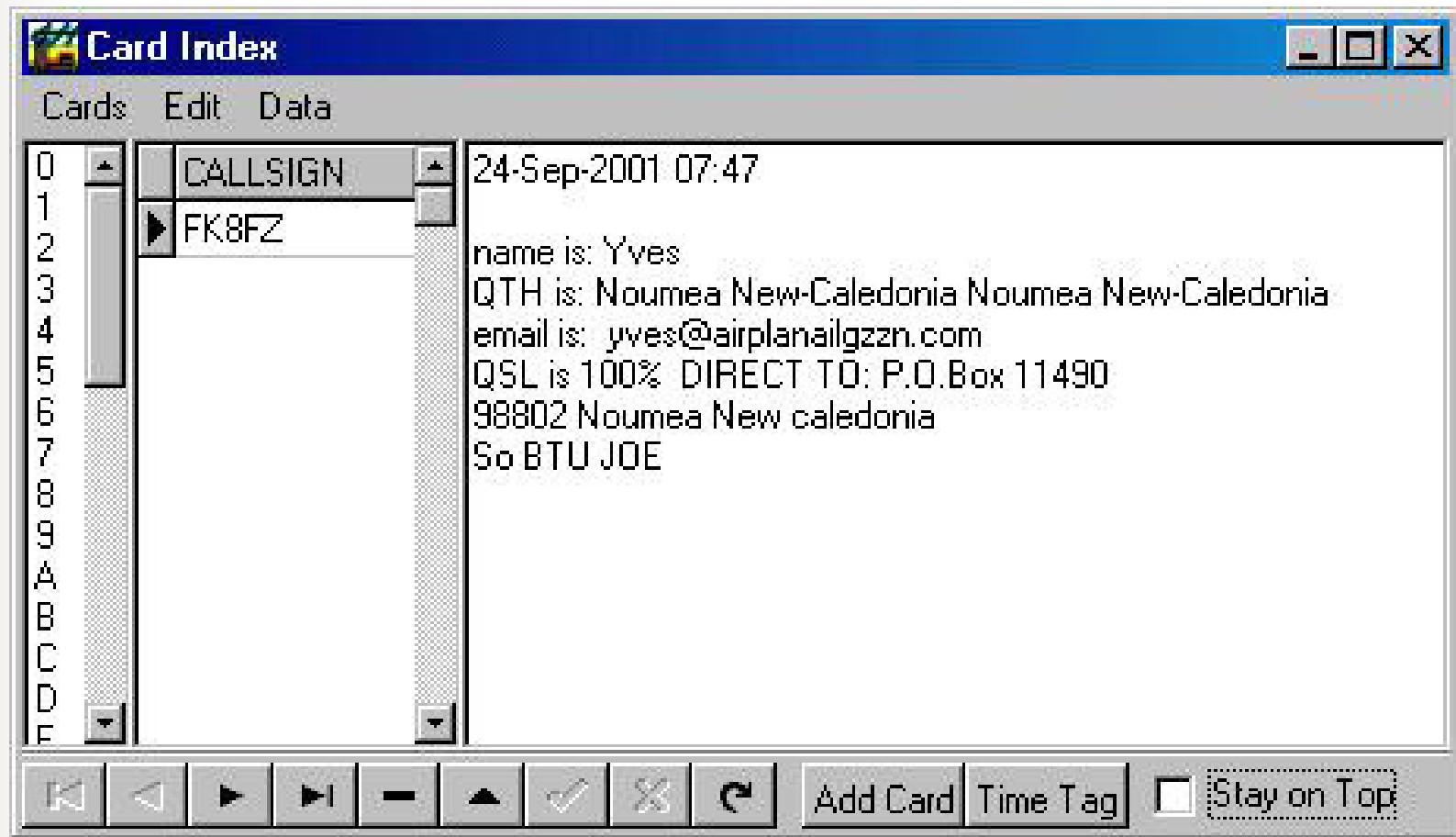
2001/09/17 0357 20 PCKT 100 599 599 - - Log

Display order: Calls Date

Write to disk Stay on Top QSL Current Entry



Card files

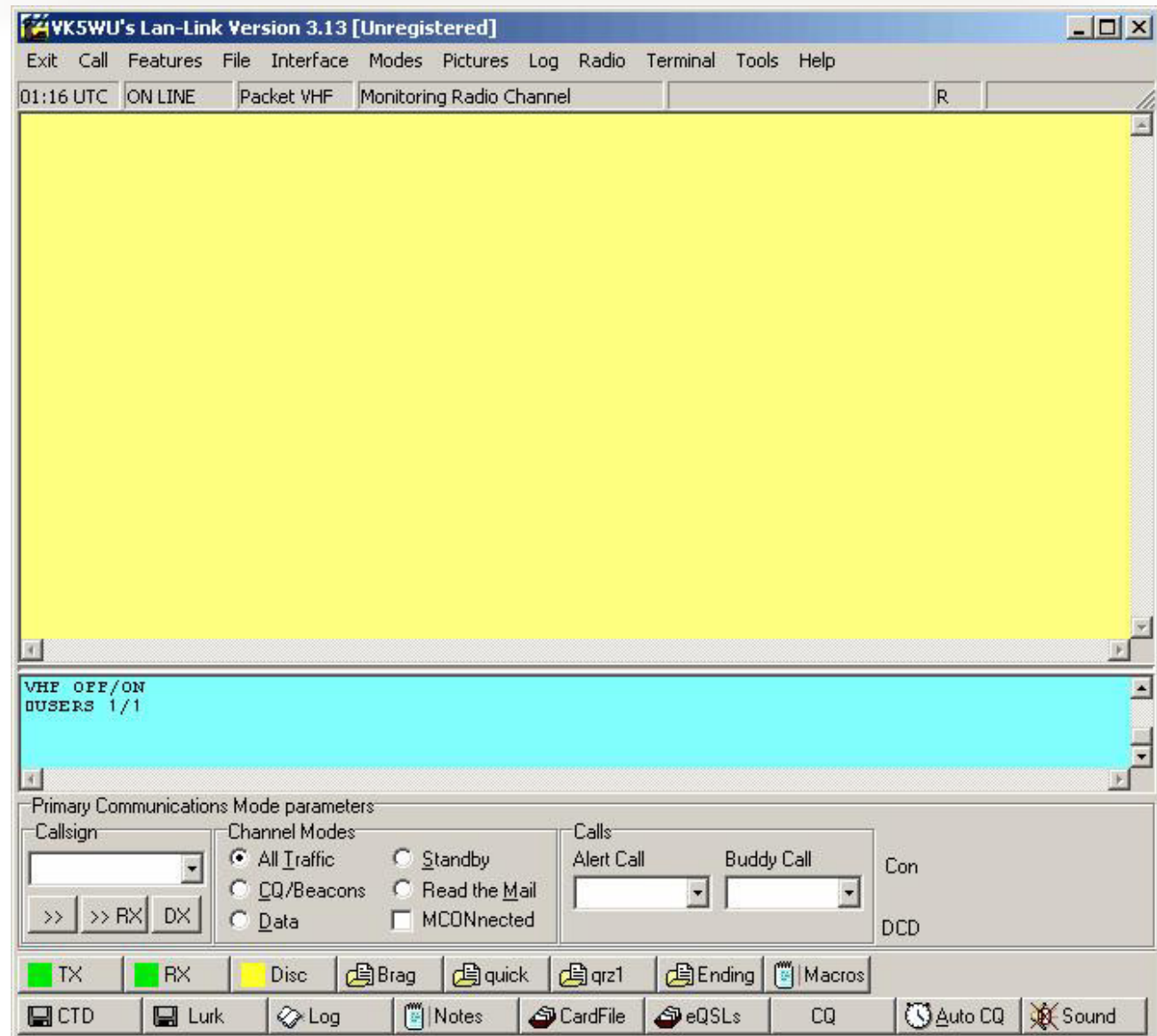


Introduction of computers

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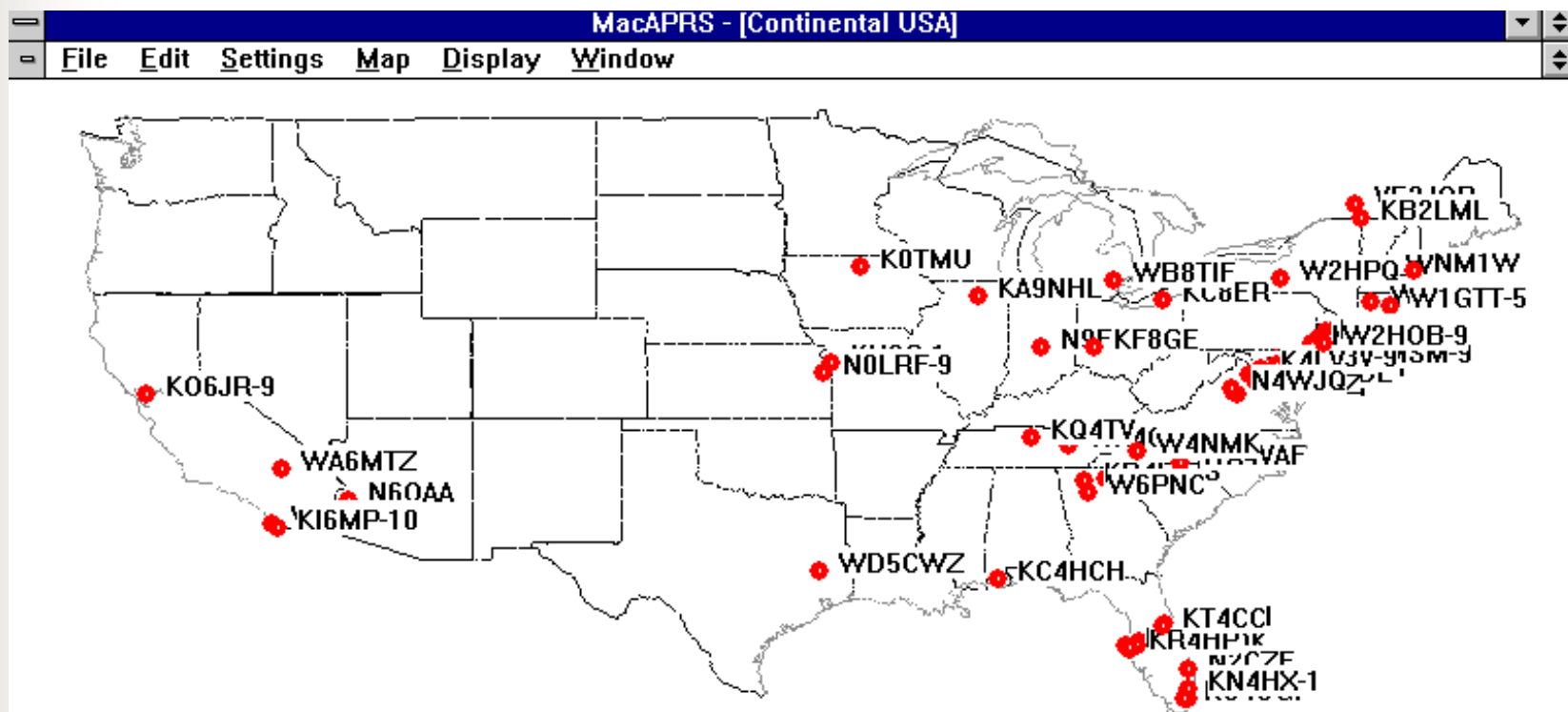
Packet radio



18/03/2018

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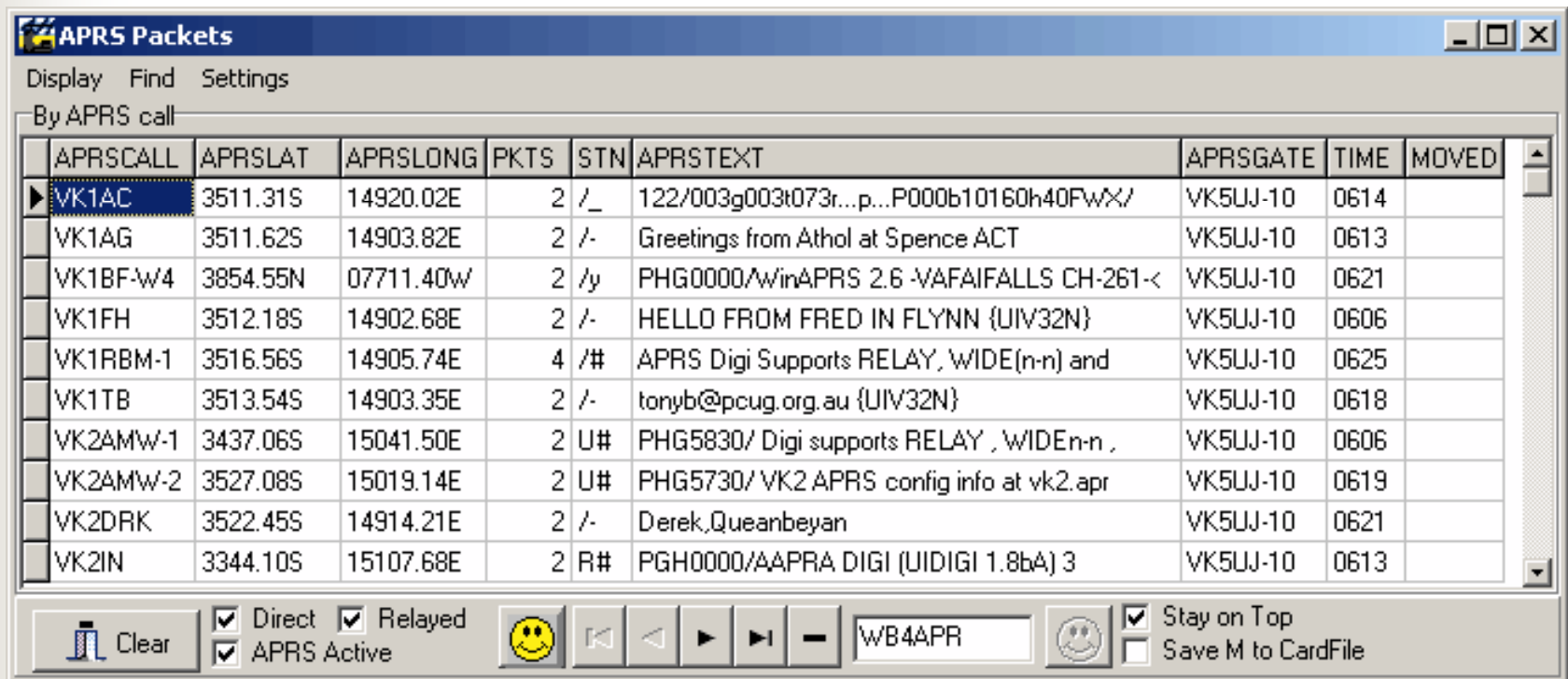
Automatic Position Reporting System (APRS)



Source: <http://aprs.rutgers.edu/WinDemo.htm>



Automatic Position Reporting System (APRS)



The screenshot shows the 'APRS Packets' window with a menu bar (Display, Find, Settings) and a toolbar. The main area displays a table of packets received by APRS call. The table has columns for APRSCALL, APRSLAT, APRSLONG, PKTS, STN, APRSTEXT, APRSGATE, TIME, and MOVED. The first row is selected, showing a packet from VK1AC.

APRSCALL	APRSLAT	APRSLONG	PKTS	STN	APRSTEXT	APRSGATE	TIME	MOVED
VK1AC	3511.31S	14920.02E	2	/_	122/003g003t073r...p...P000b10160h40FwX/	VK5UJ-10	0614	
VK1AG	3511.62S	14903.82E	2	/-	Greetings from Athol at Spence ACT	VK5UJ-10	0613	
VK1BF-W4	3854.55N	07711.40W	2	/y	PHG0000/WinAPRS 2.6 -VAFAIFALLS CH-261-<	VK5UJ-10	0621	
VK1FH	3512.18S	14902.68E	2	/-	HELLO FROM FRED IN FLYNN {UIV32N}	VK5UJ-10	0606	
VK1RBM-1	3516.56S	14905.74E	4	/#	APRS Digi Supports RELAY, WIDE(n-n) and	VK5UJ-10	0625	
VK1TB	3513.54S	14903.35E	2	/-	tonyb@pcug.org.au {UIV32N}	VK5UJ-10	0618	
VK2AMW-1	3437.06S	15041.50E	2	U#	PHG5830/ Digi supports RELAY , WIDEn-n ,	VK5UJ-10	0606	
VK2AMW-2	3527.08S	15019.14E	2	U#	PHG5730/ VK2 APRS config info at vk2.apr	VK5UJ-10	0619	
VK2DRK	3522.45S	14914.21E	2	/-	Derek_Queuebeyan	VK5UJ-10	0621	
VK2IN	3344.10S	15107.68E	2	R#	PGH0000/AAPRA DIGI (UIDIGI 1.8bA) 3	VK5UJ-10	0613	

At the bottom of the window, there is a toolbar with a 'Clear' button, checkboxes for 'Direct', 'Relayed', and 'APRS Active', a smiley face icon, navigation buttons, a text field containing 'WB4APR', another smiley face icon, and checkboxes for 'Stay on Top' and 'Save M to CardFile'.



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 - APRS
- **DX alerts**
- Contests
- Award records
- Propagation predictions
- SSTV



Software for Amateur Radio 1981



DX alerts

```
DX de N7ON:      10114.6  KL7J              0419200
WCY de DKOWCY-3 <4> : K=2 expK=3 A=10 R=228 SFI=235 SA=act GMF=act Au=no00
DX de UA6JY:     24893.0  FR5FD            0421200
DX de N6KD:      10105.9  ZK1QMA          up 1           0421200
DX de WA2JQK:     3793.0   MOKKW           0423200
DX de JE1NCP:    24893.0  ZL7/G3TXF       up2 FB SIG     0425200
DX de ND8L:      14070.0  W6I             PSK Route 66 Special Events St 04292 EN9100
DX de UA6JY:     24898.0  FR5FD           CQ             0429200
DX de SP8HQQ:    14004.9  3D2AG          599 qsx up    0432200
DX de K2VCO:     21023.0  ZL7/G3SXW       up 1           0434200
DX de JA6TMU:    24898.0  FR5FD           0435200
DX de WA7BOD:    14005.0  3D2AG           UP             0437200
DX de N7HIY:     24893.0  ZL7/G3TFX       up 1           0437200
DX de N4SU:      1834.4   DF2PY           wolf--big sig poor band 0439200
DX de N7HIY:     24893.0  ZL7/G3TXF       corr call     0439200
DX de OK1FM:     10105.2  ZK1QMA          MY GREYLINE START-HE IS QRT 0443200
DX de K6UT:      14195.0  FOOFLA          Dave           0439200
DX de UA6LGR:    14005.0  3D2AG           QSX UP 1      04432 KN9700
DX de 9A5ST:     14005.0  2D2AG           up via CBA    04432 JN8300
DX de 9A5ST:     14005.0  3D2AG           sry call     04442 JN8300
DX de LA6CHA:    14004.9  3D2AG           0440200
DX de UA6LGR:    14015.0  3D2AG           04402 JN8300
```



Packet radio

- Sortable
 - Frequency
 - Callsign
 - Time
- Colour changes to show age
- Radio interface
- Click to access

DXFreq	DXcall	Time	Heard by
14,039.0	3V8BB	0504	NX7K
14,036.6	9A1AA	0451	NX7K
28,024.0	9H0A	0505	YV1DIG
28,019.1	BV/JA0ID	0505	UY5EG
14,199.0	CO6XN	0504	DL6RA
7,003.0	CW6V	0503	DK2CK
28,011.2	EX8W	0506	2E0AOZ
14,052.2	HC8N	0507	JR7COP
144,000.0	HSCW	0502	EI4IX
14,034.0	J41YM	0504	N6JV
28,038.6	JY9NX	0502	SP3HLM
14,038.9	NX7K	0503	RK3AWL
7,030.7	S59A	0504	5W1BL
14,012.0	SV5/DL3DRN	0504	DF5UL
7,060.6	T48K	0504	F6ARC
14,054.9	UA3DPX	0503	K0MS

DX ? [Navigation buttons] PX Check Active

By Frequency
Last DX Alert
DX_Call Freq. Time State
9H0A **28024.0** **0505** **DX 9H**

Fade times
Hot Warm Cold
5 15 60

Stay on top Check 2nd Log



Contests –Scenarios

■ Scenario

- Many stations on the air for a fixed period of time
- All want a quick QSO and generally need to contact you
- Lots of QRM

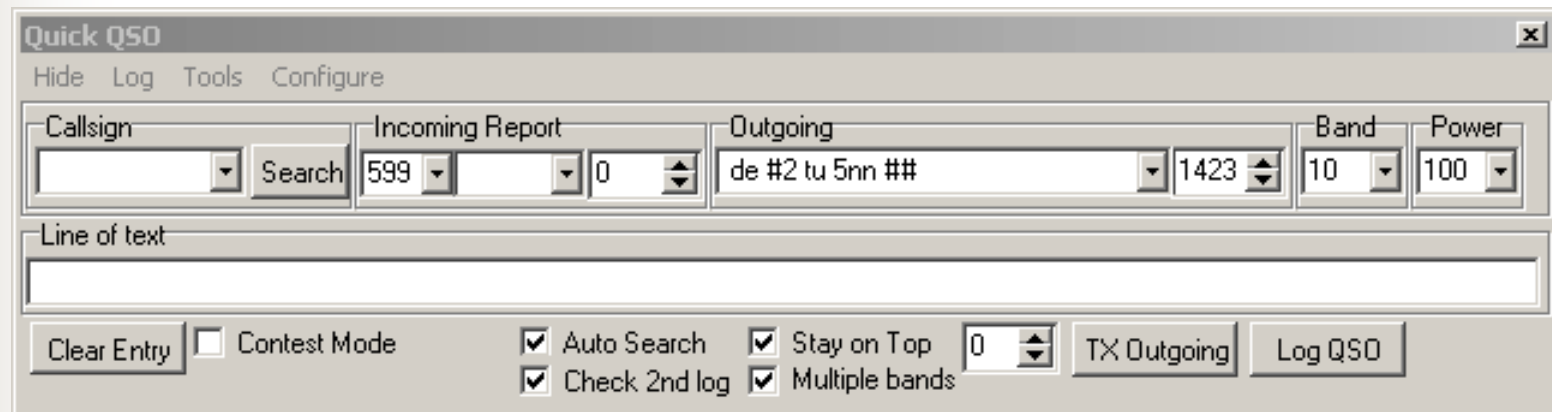
■ Opportunity

- Work new entities
 - DX, IOTA, States, Counties, Grid Squares, Other
- Test something
 - Hardware or software



Contests – software to work new DX countries

- Set up the software for finding new DX countries
- Use it



Contests - logs

Logbook: hflog.dbf

DATE	TIME	BAND	CALL	RX	TX	MODE	POWER	S	R	COMMENTS
2001/09/10	1217	15	RU3QW	599	559	PSK31	100	-	-	quick qso poor copy
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2001/09/12	1047	20	JA4IQR	599	599	PSK31	100	-	-	Yoo, Okayama
2001/09/12	1100	20	JA2FY	500	500	PSK31	100	-	-	Miz, PM85
								-	-	Paul
								-	-	Jose AF16 St Louis
								-	-	Ronni- not sure of c
								-	-	EJ EM45
								-	-	Seoul
								-	-	Paul
								-	-	John Pinetop AZ

Second Logbook: C:\Program Files\Borland\Delphi4\Lan_link\w4hflog.DBF

DATE	TIME	BAND	CALL	RX	TX	MODE	POWER	S	R	COMMENTS
2001/11/19	0230	80	N4RZ	59	59	SSB	100	E	-	010-558-Q 69 KY
2001/11/19	0238	80	KK1L	59	59	SSB	100	E	-	011-1527-B 93 VT
2001/11/19	0249	80	W3SO	59	59	SSB	100	E	-	012-731-M 00 WPA
2001/11/19	0251	80	W4NF	59	59	SSB	100	E	-	013-1432-U 75 VA
2001/11/19	0254	80	AI3M	59	59	SSB	100	E	-	014-815-A 53 MDC
2001/11/19	0257	80	K8OQL	59	59	SSB	100	E	-	015-372-B 59 WVA
2002/07/17	0312	80	FG/DK1MM	59	59	SSB	100	-	-	
2002/07/17	0320	17	PP5XZ	55	55	SSB	100	-	-	

599 - - [] Log

to disk [] QSL QSL Current Entry

Navigation: [Back] [Previous] [Next] [Forward] [Search] Stay on Top Read only

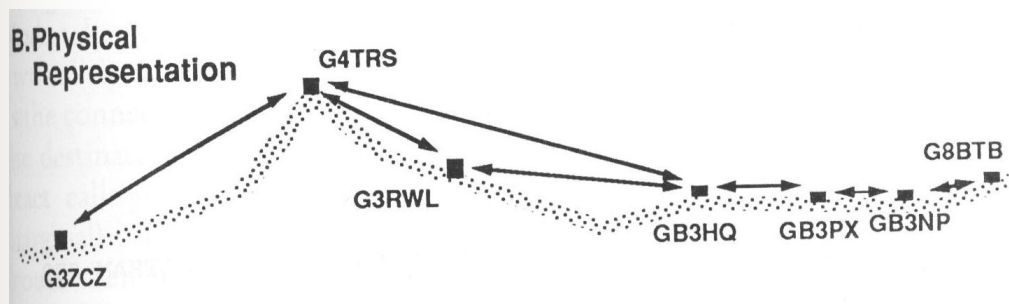
Callsign
 Search

To search both logs



Contests – finding the stations

- Know when the band is open
- Tune for them
- PacketCluster
 - Radio
 - Internet



DXFreq	DXcall	Time	Heard by
14,039.0	3V8BB	0504	NX7K
14,036.6	9A1AA	0451	NX7K
28,024.0	9H0A	0505	YV1DIG
28,019.1	BV/JA0ID	0505	UY5EG
14,199.0	CO6XN	0504	DL6RA
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28,038.6	JY9NX	0502	SP3HLM
14,038.9	NX7K	0503	RK3AWL
7,030.7	S59A	0504	5W1BL
14,012.0	SV5/DL3DRN	0504	DF5UL
7,060.6	T48K	0504	F6ARC
14,054.9	UA3DPX	0503	K0MS



Contests – transmitting information

- Use Macro keys for data and Voice
 - CQ
 - Exchange
 - Common messages
 - QRZ
 - Call?
 - Worked B4



Automating contests - digital



Sometimes you need to step outside during a contest

- Automatic Beacons –report in real time
 - AMTOR
 - 4X/G3ZCZ to VU2IJ
Asynchronous QSO
 - 1987/04/22 – 1987/08/08
 - DX
- AMTOR
 - +?
- Packet
 - > at end of line
- Pactor



Introduction of computers

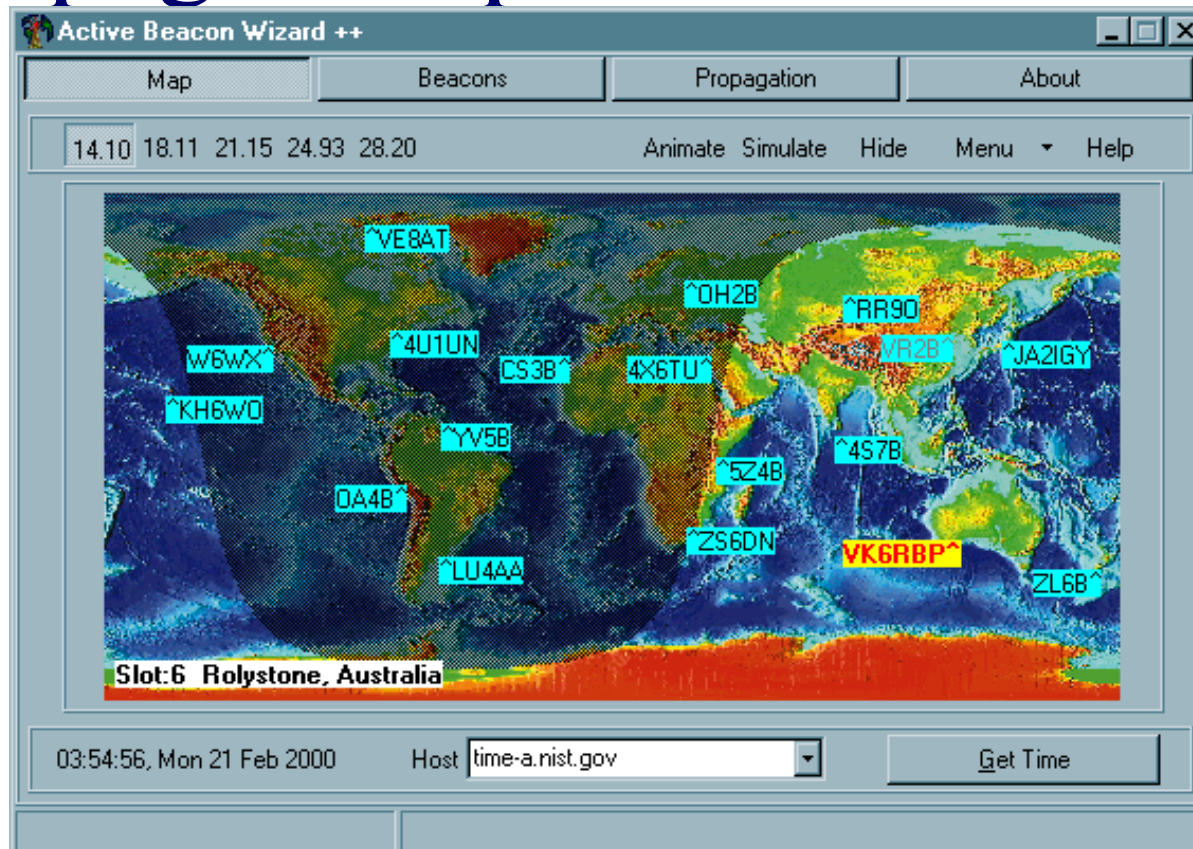
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[young] **Martin Sweeting at UoS**



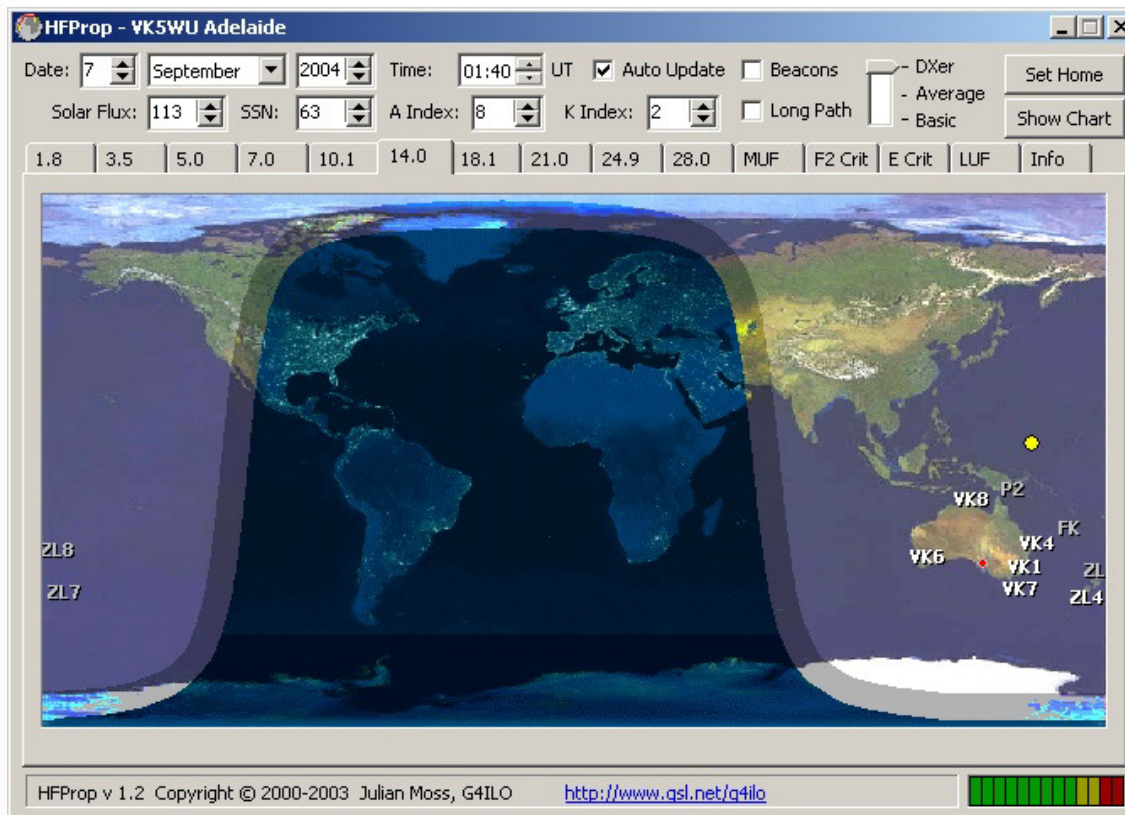
Propagation predictions-1



Source: [HTTP://www.taborsoft.com/abw/](http://www.taborsoft.com/abw/)



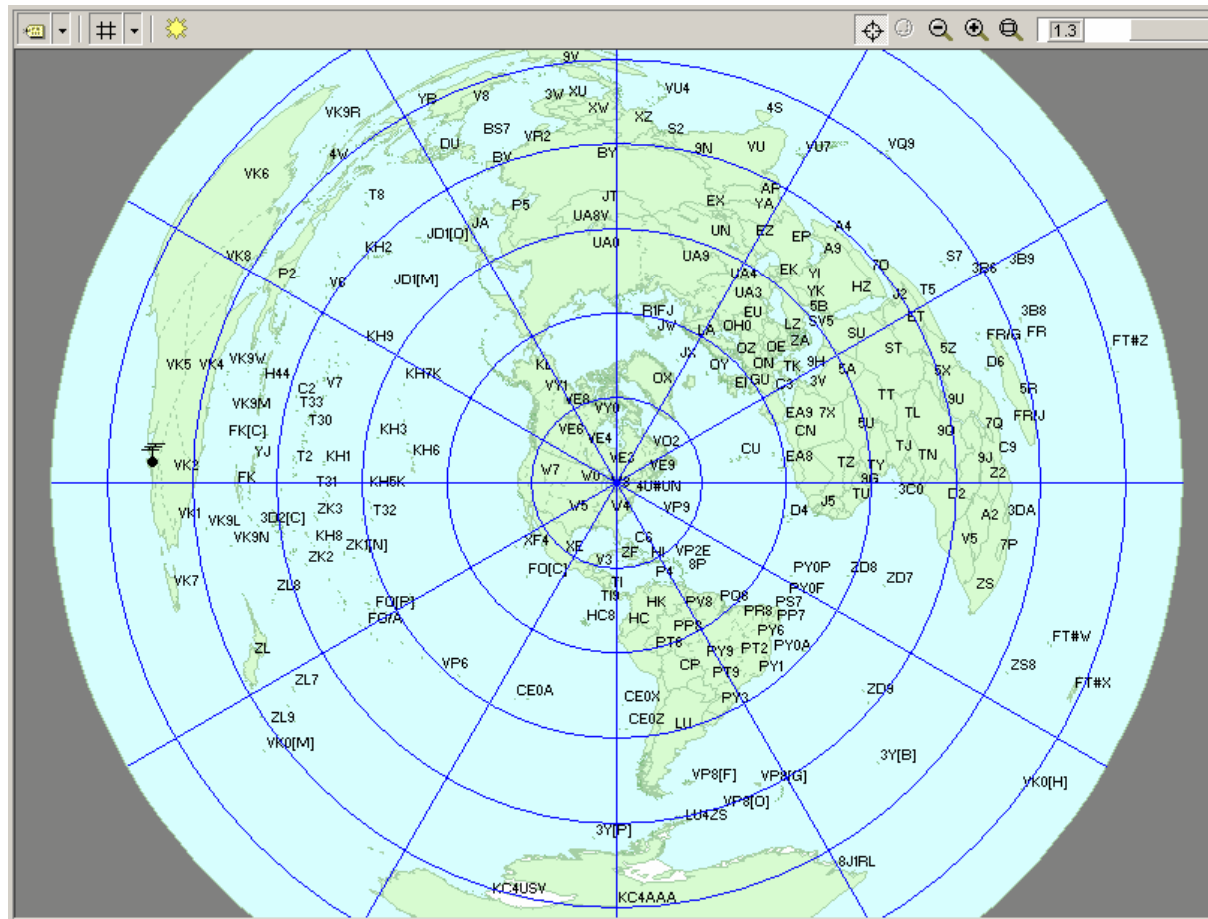
Propagation predictions-2



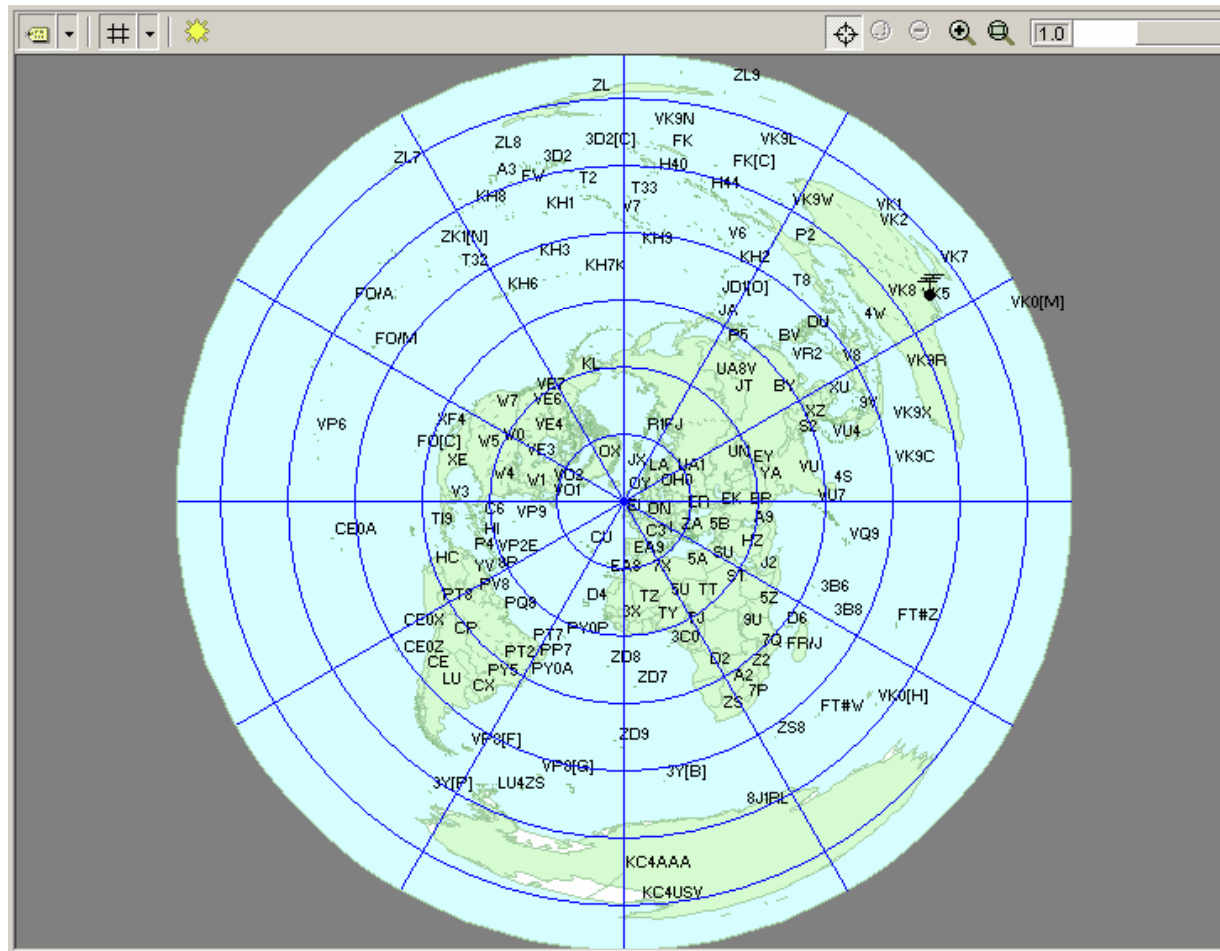
Source: [HTTP://www.qsl.net/g4ilo](http://www.qsl.net/g4ilo)



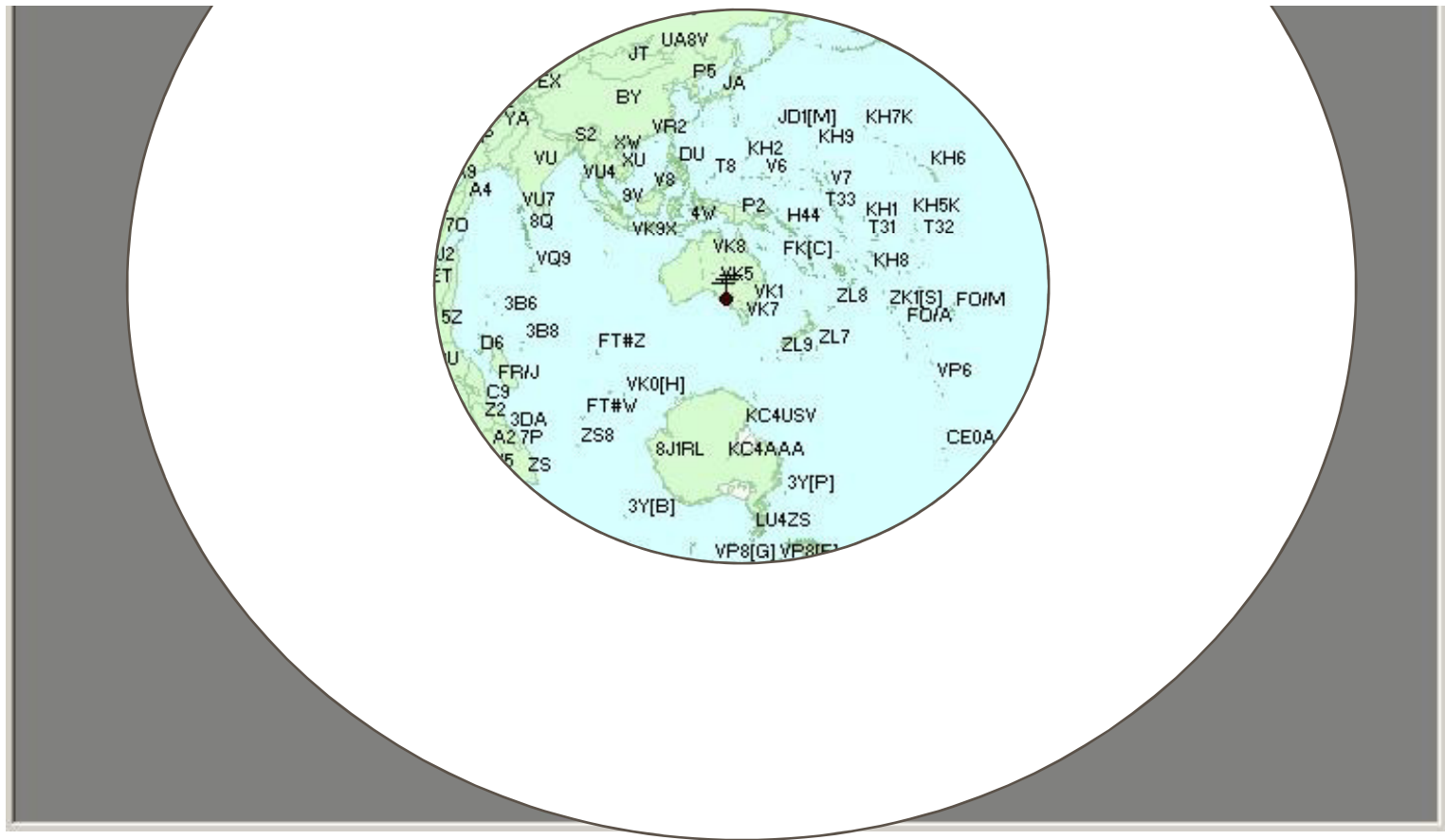
DX Atlas – W8 centric



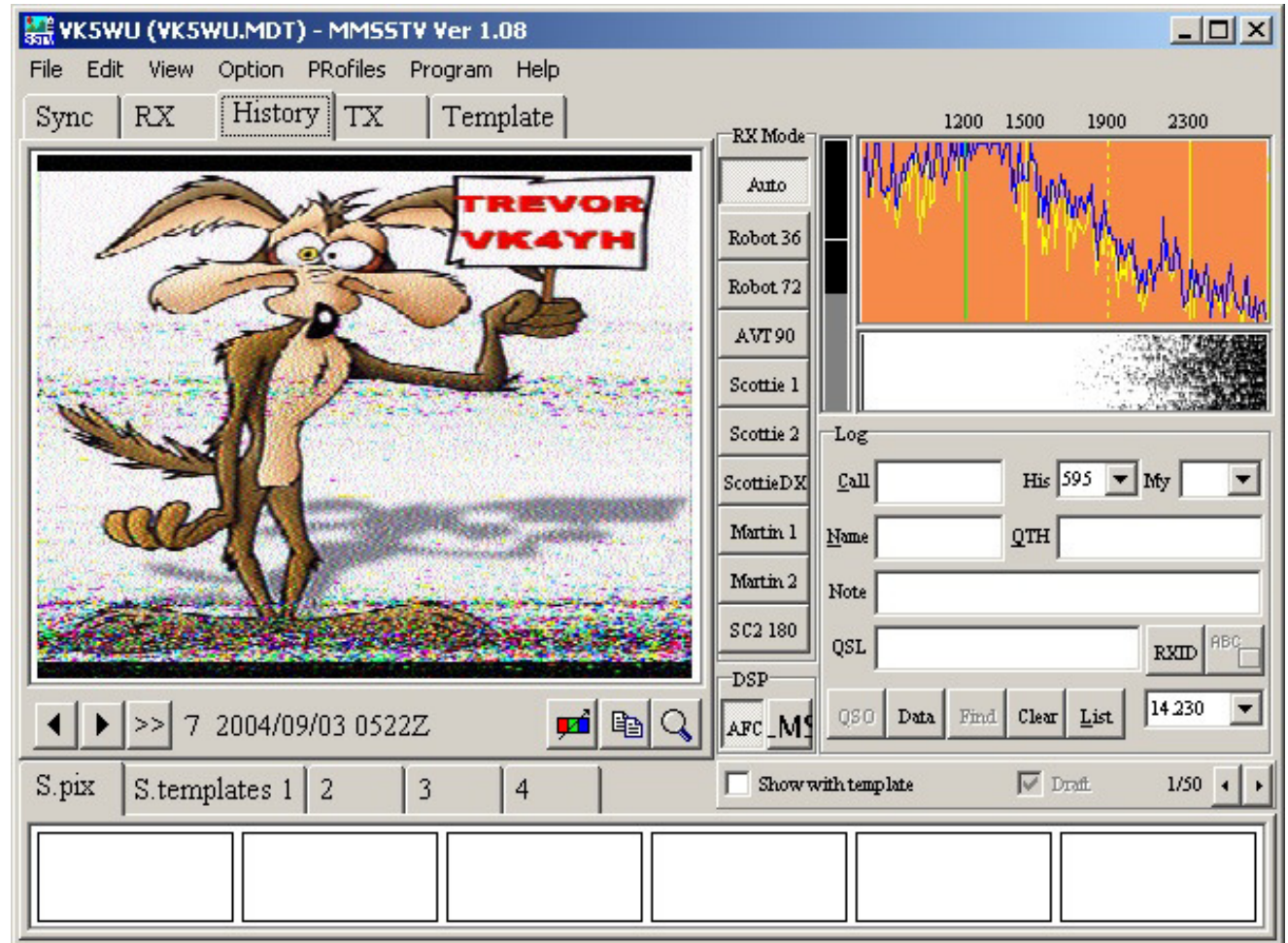
DX Atlas – G3 centric



DX Atlas – VK5 centric



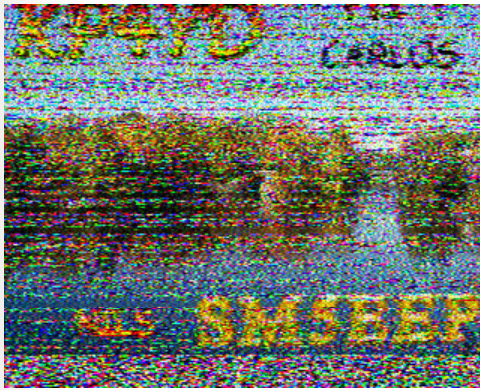
SSTV



[Http://www.qsl.net/mmhamsoft/](http://www.qsl.net/mmhamsoft/)



SSTV pictures (off the air@vk5wu)

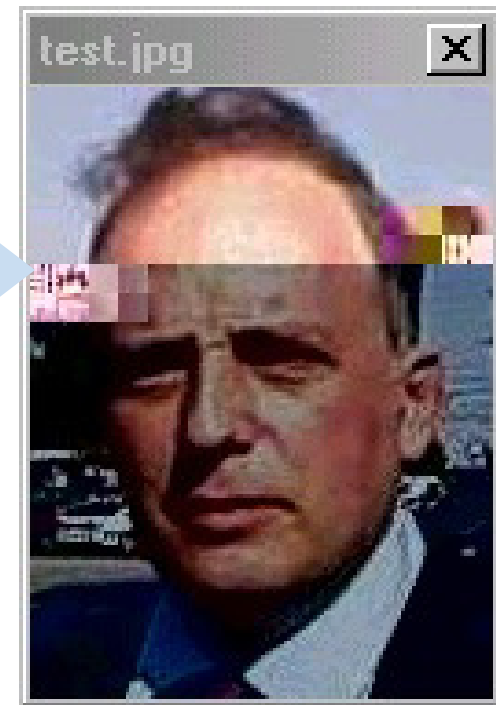


Digital SSTV no error correction



As sent

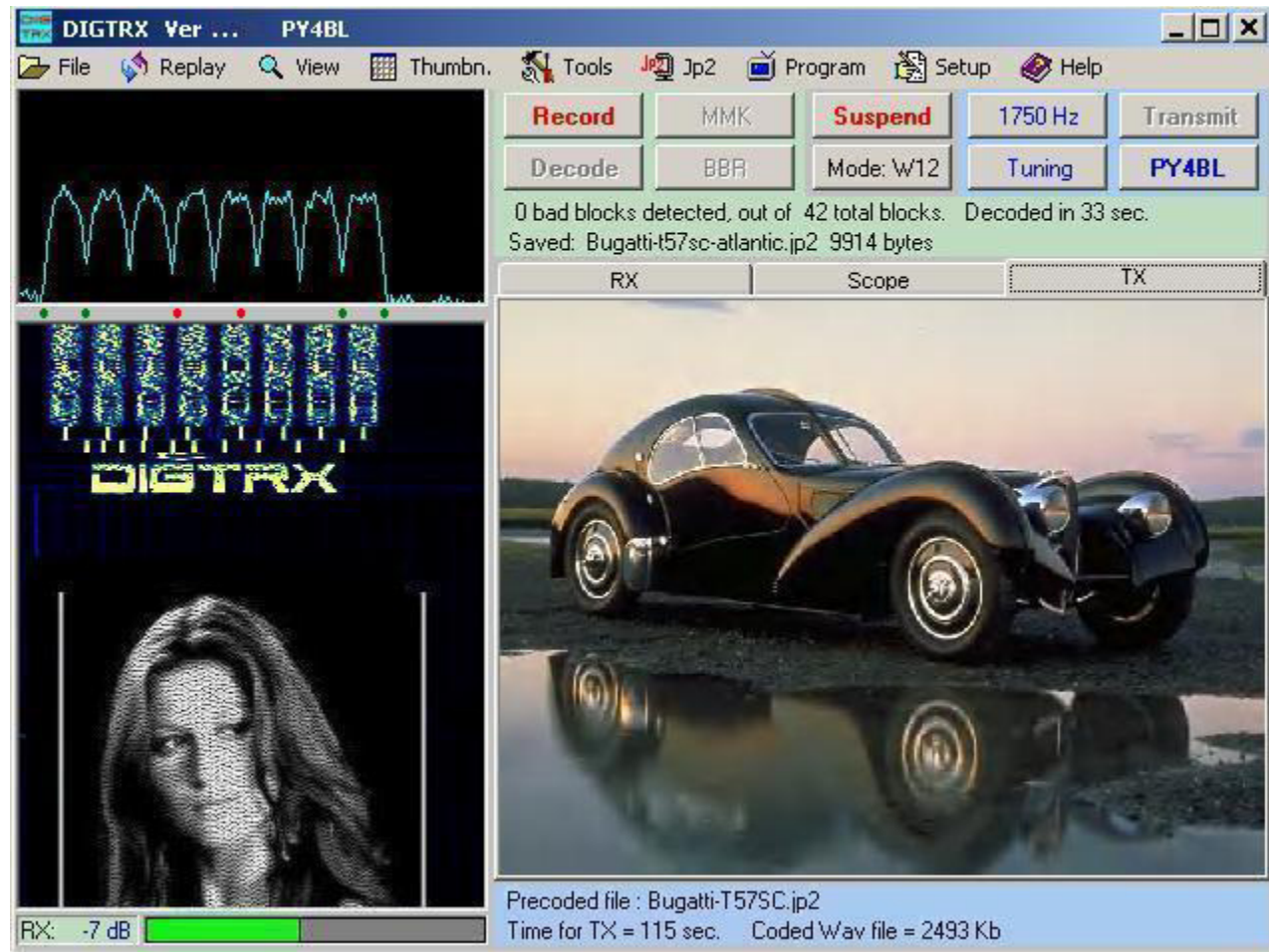
Noise burst



As received
(simulated)



Digital SSTV



Topics

- Conventional amateur radio
- Introduction of computers
- **OSCAR**
- Digital communications
- Automating Communications
- The Internet
- The future?
- Concerns
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OSCAR

- **Spacecraft**
 - Command and control
 - Telemetry
- **Ground segment**
 - Orbit predictions
 - Command and control
 - Telemetry formatting and display
 - Automated operations



Satscape

SATSCAPE HOME PAGE

- Introduction
- Download Files
- News & Mailing List
- Extra Downloads
- Help & FAQ
- Satscape Shop
- Me & Satscape
- Other Freeware
- Beginners Guide

Introduction

Satscape is a Freeware Program for the PC. It produces realtime displays of where any Satellite is, and predicts passes for your locale. There are about 8000+ satellites in orbit, alot of these are just junk and debris such as discarded rocket bodies, but quite a few are working Satellites.

Their positions can be calculated very accuratly using pure maths, no need for a huge radar dish in your back garden. Satscape will do the maths for you, and present their positions in a nice graphical way. Passes over your part of the world can be predicted weeks in advance in a matter of seconds.

You don't have to use or have access to the satellites, as it will even predict when the 150 'Brightest' satellites pass over, so you can SEE them, and impress friends with your "psychic" abilities by predicting to the nearest second when they are about to pass over.

It can currently track 500 satellites simultaneously, with Various graphically-rich Map Views with ground tracks and footprints, Horizon view, tabular list and more. Its highly graphical, and has optional speech to announce satellites as they come into range. Tracking Data known as "Keplerian Elements" are used to work out their positions. Updating the keplerian elements couldn't be easier, just one click from the menu, and it will connect via your internet connection, and update them, making Satscape one of the easiest and most up-to-date Satellite Tracking programs available.

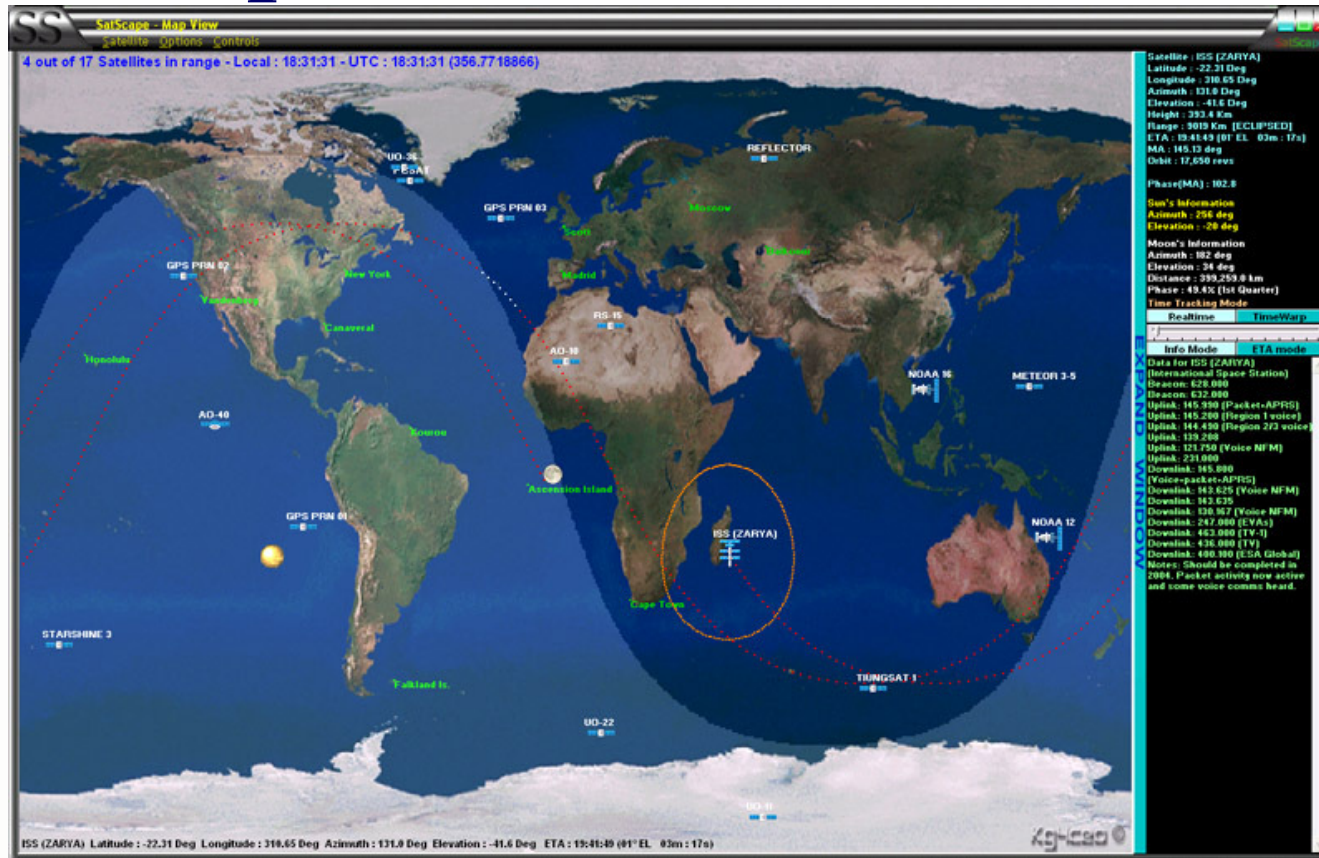
[View Screenshots](#)

Satscape v1.88 is now available - New and Improved (and still free!)

[Guest book / Map](#) [NASA](#) [Upcoming Launches](#) [Streaming Radio & TV](#)



Satscape



<http://www.satscape.co.uk/images/ss-screen1.jpg>



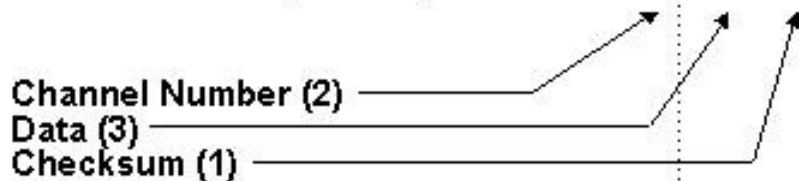
Raw UoSAT Telemetry

ASCII WITH ERROR CHECKING ON EACH DATUM

```
00519D0141370267650361400404660503;4 6019E07045608040C08036C
10519C11298312000313056114069A15529A! 6188;175452185905195058
20519F21220322662223000124001725000726093E27541528564D294681
30519E31041732287C33568B34007035217236276637393D38426B39455E
4064;;;ghghf42647343061044162545000146000247444748454949422x
.....
50456251108D52634653284p54663215000056p00357451258447A59460E
60826A615FC1625F4A63334164440265160466174267700668000E69000F
UOSAT-2          9101281004625
```

Note : Errors due to noise.

10 Channels per line, fixed format NNDDDC



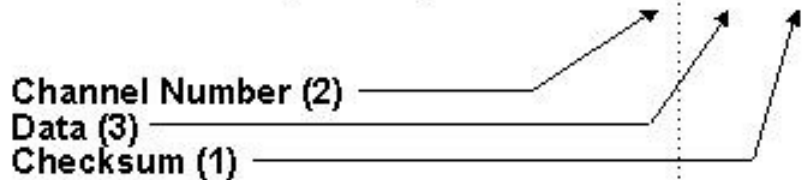
Raw UoSAT Telemetry

ASCII WITH ERROR CHECKING ON EACH DATUM

```
00519D0141370267650361400404660503;4 6019E07045608040C08036C
10519C11298312000313056114069A15529A! 6188;175452185905195058
20519F21220322662223000124001725000726093E27541528564D294681
30519E31041732287C33568B34007035217236276637393D38426B39455E
4064;;;ghghf42647343061044162545000146000247444748454949422x
5056251108D52634653284p54663215000056p00357451258447A59460E
626A615FC1625F4A63334164440265160466174267700668000E69000F
UOSAT-2          9101281004625
```

Note : Errors due to noise.

10 Channels per line, fixed format NNDDDC



Fuji-OSCAR 20 raw telemetry

```
05-Jun-91 09:43:35 8J1JBS*>BEACON:  
JAS1b RA 91/06/05 09:39:58  
493 481 688 691 854 839 850 833 002 746  
615 000 418 453 457 448 451 454 651 000  
683 681 745 713 999 643 874 385 1BE 000  
010 111 011 000 111 100 001 100 111 000
```

- AX.25 LINK DOES ERROR CHECKING
- FIXED FORMAT



Fuji-OSCAR 20 decoded TLM

Solar Panel Temp #1:	15.20 Deg.C	Total Array Current:	1105.89 mA
Solar Panel Temp #2:	31.92 Deg.C	Battery Charge	: 102.87 mA
Solar Panel Temp #3:	32.68 Deg.C	Battery Voltage	: 14.806 V
Solar Panel Temp #4:	29.64 Deg.C	Battery Center	: 6.744 V
Baseplate Temp. #1 :	40.73 Deg.C	Bus Voltage	: 17.259 V
Baseplate Temp. #2 :	41.42 Deg.C	+5 V Regulator	: 5.214 V
Baseplate Temp. #3 :	40.87 Deg.C	-5 V Regulator	: 0.000 V
Baseplate Temp. #4 :	41.14 Deg.C	+10 V Regulator	: 10.471 V
Temperature Cal. #1:	1.30 V	Offset Voltage #1	: 0.000 V
Temperature Cal. #2:	1.29 V	Offset Voltage #2	: 0.000 V
Temperature Cal. #3:	1.75 V	Calibration Volt #2:	1.230 V
Battery Temp.	: 45.04 Deg.C	JTA TX Output Power:	0.46 W
JTD Temperature	: 42.12 Deg.C	JTD TX Output Power:	3.52 W



Typical TLM system

SPACECRAFT



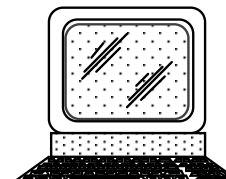
REAL TIME
DOWNLINK DATA

NOISE

AERIAL

PA/ RX

RADIO MODEM



PASS PREDICTION (TRACKING) DATA

TELEMETRY DECODING DATA

TELEMETRY ARCHIVE (OFF LINE)



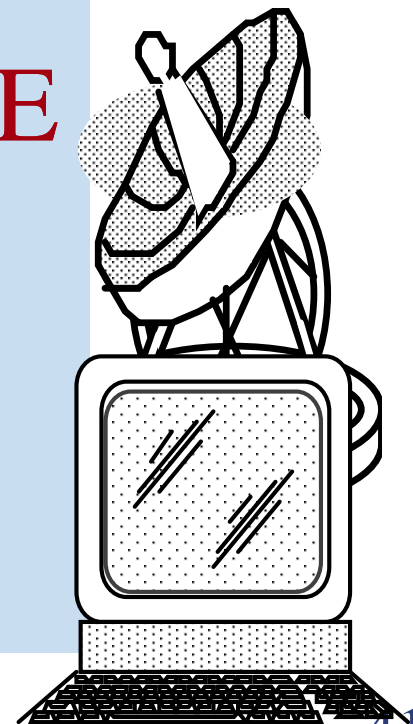
Need for Standards

AMATEUR SATELLITE TELEMETRY

PAST, PRESENT & FUTURE

JOE KASSER, G3ZCZ

National Telesystems
Conference, May 1992



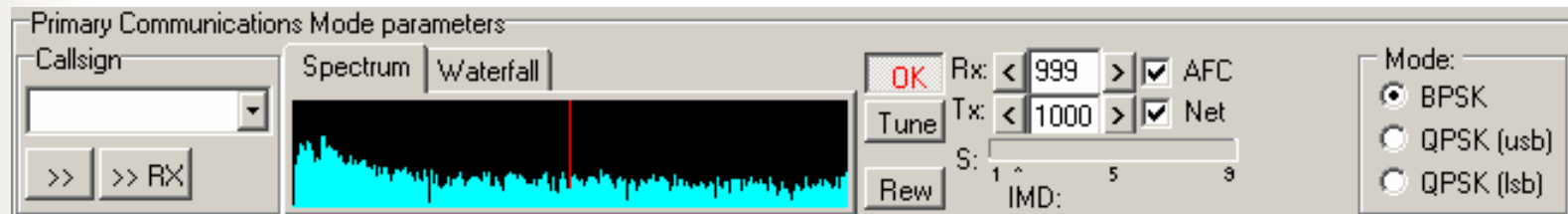
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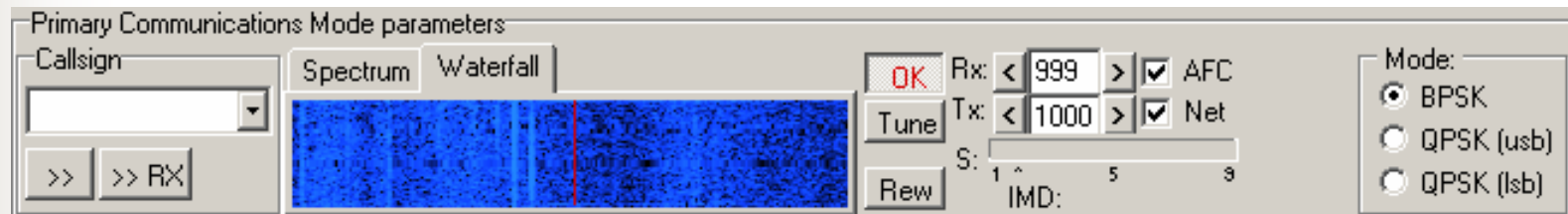
Digital communications

- Teletypewriter replacements
 - RTTY stayed at 45/50 Baud
- New modes
 - AMTOR
 - Packet radio
 - PACTOR
 - PSK31, MFSK
 - Etc.

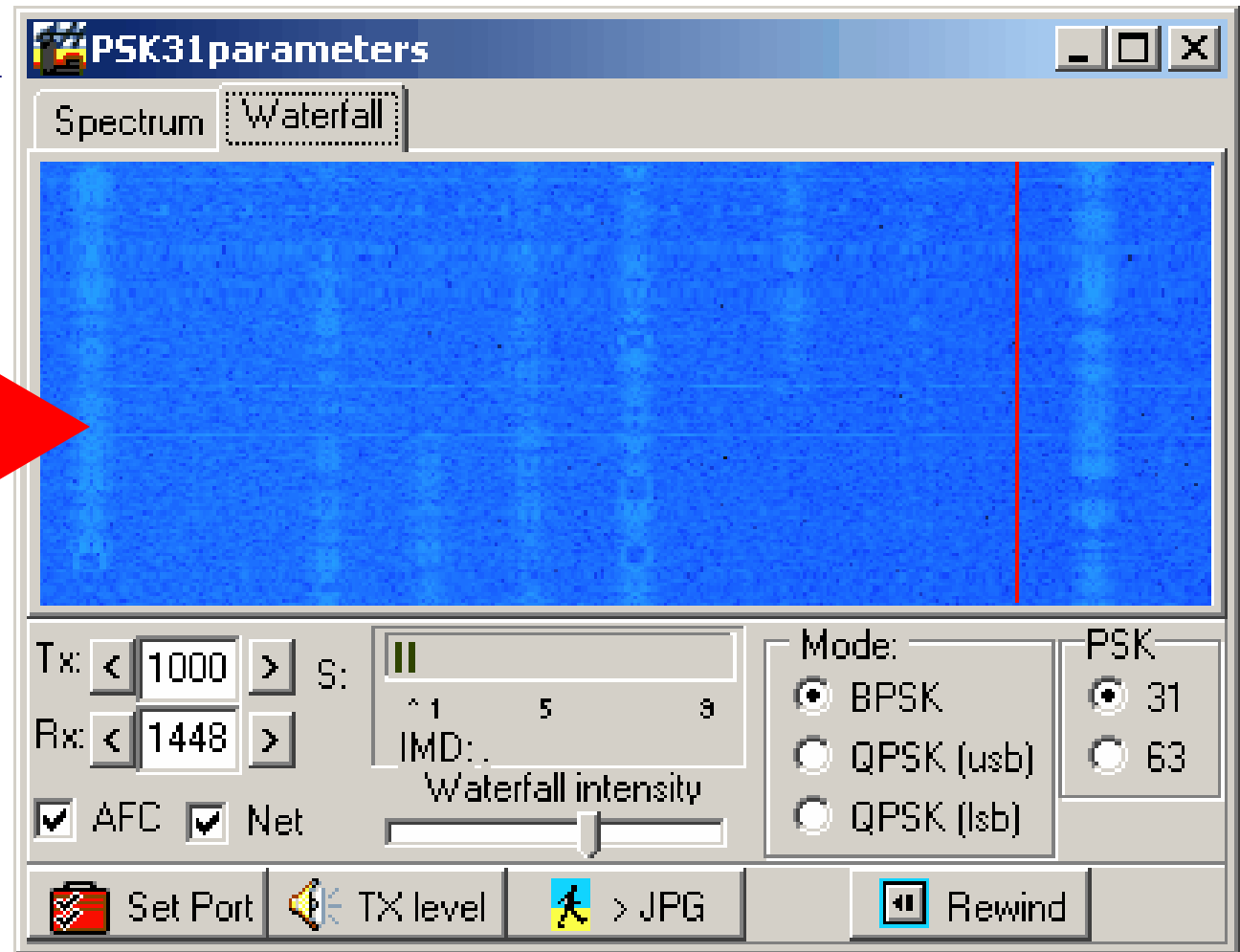


Digital communications

- Teletypewriter replacements
 - RTTY stayed at 45/50 Baud
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 - PSK31
 - Etc.



PSK31

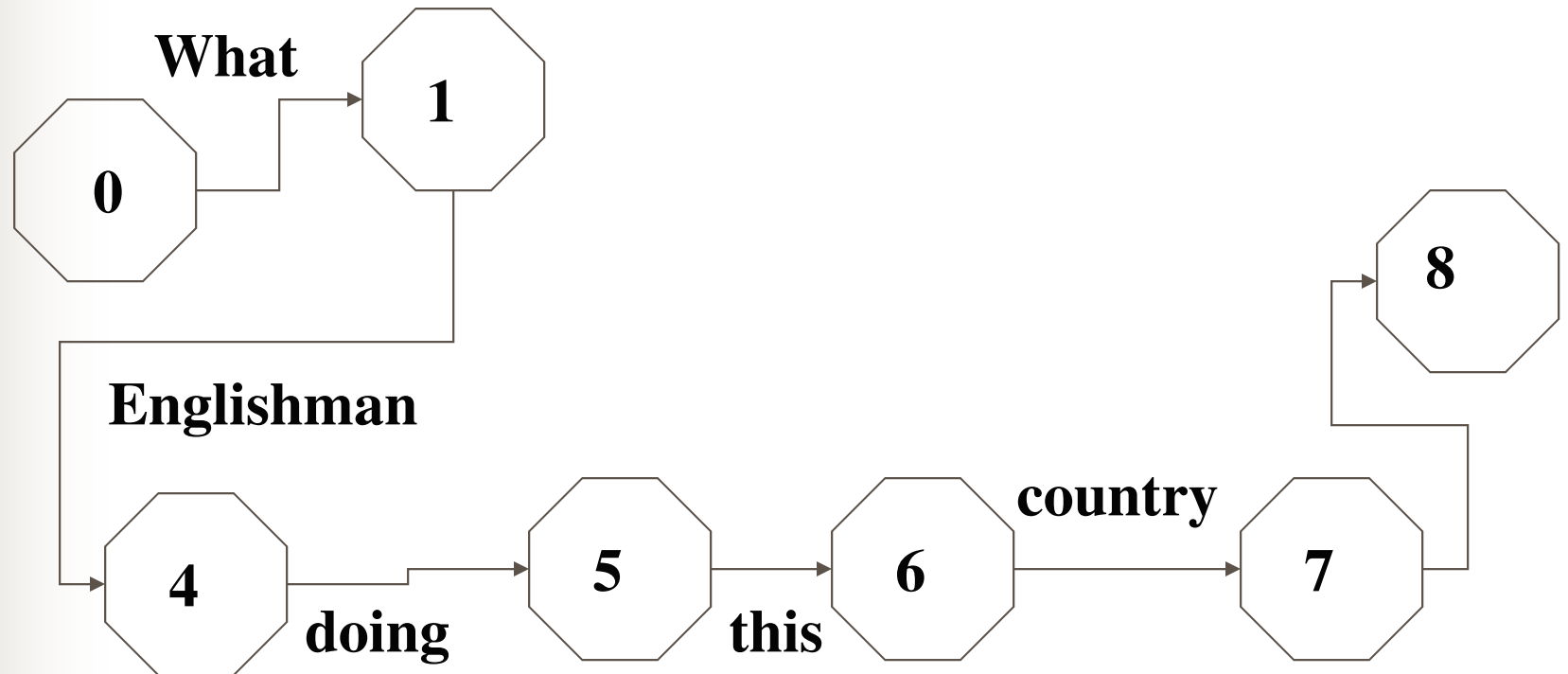


Automating Communications

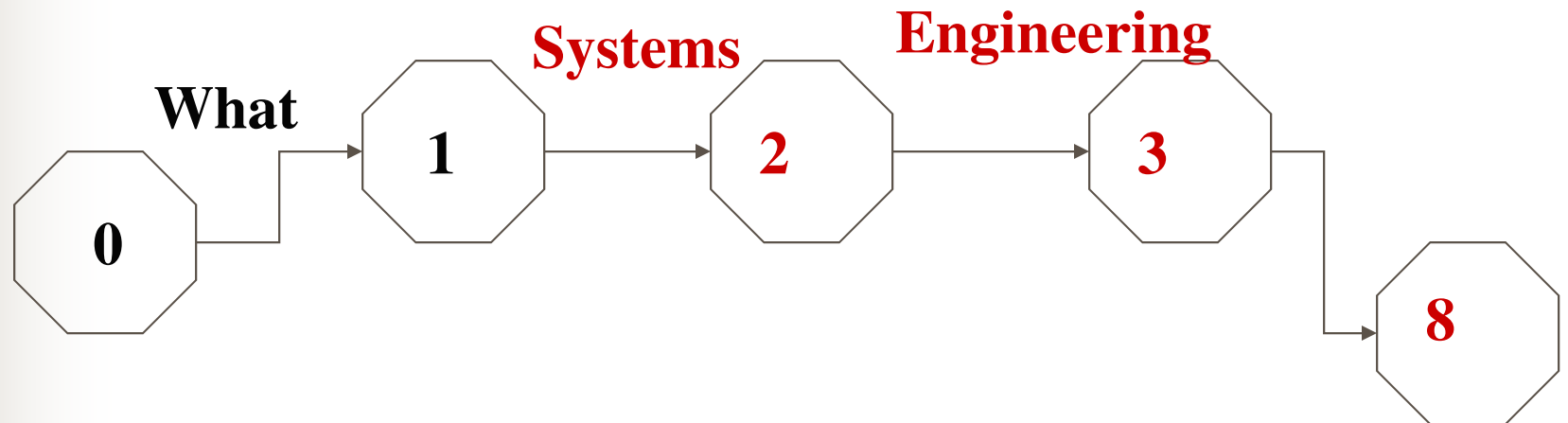
- Automatic CQ devices
- Automatic Packet radio message passing
- Automatic QSY for LEO OSCAR passes
- CW keyboards and readers
- DX alerts can tune radios to DX frequency
- Accessories
 - DX Atlas
- Automating QSOs
 - Smart brag tapes



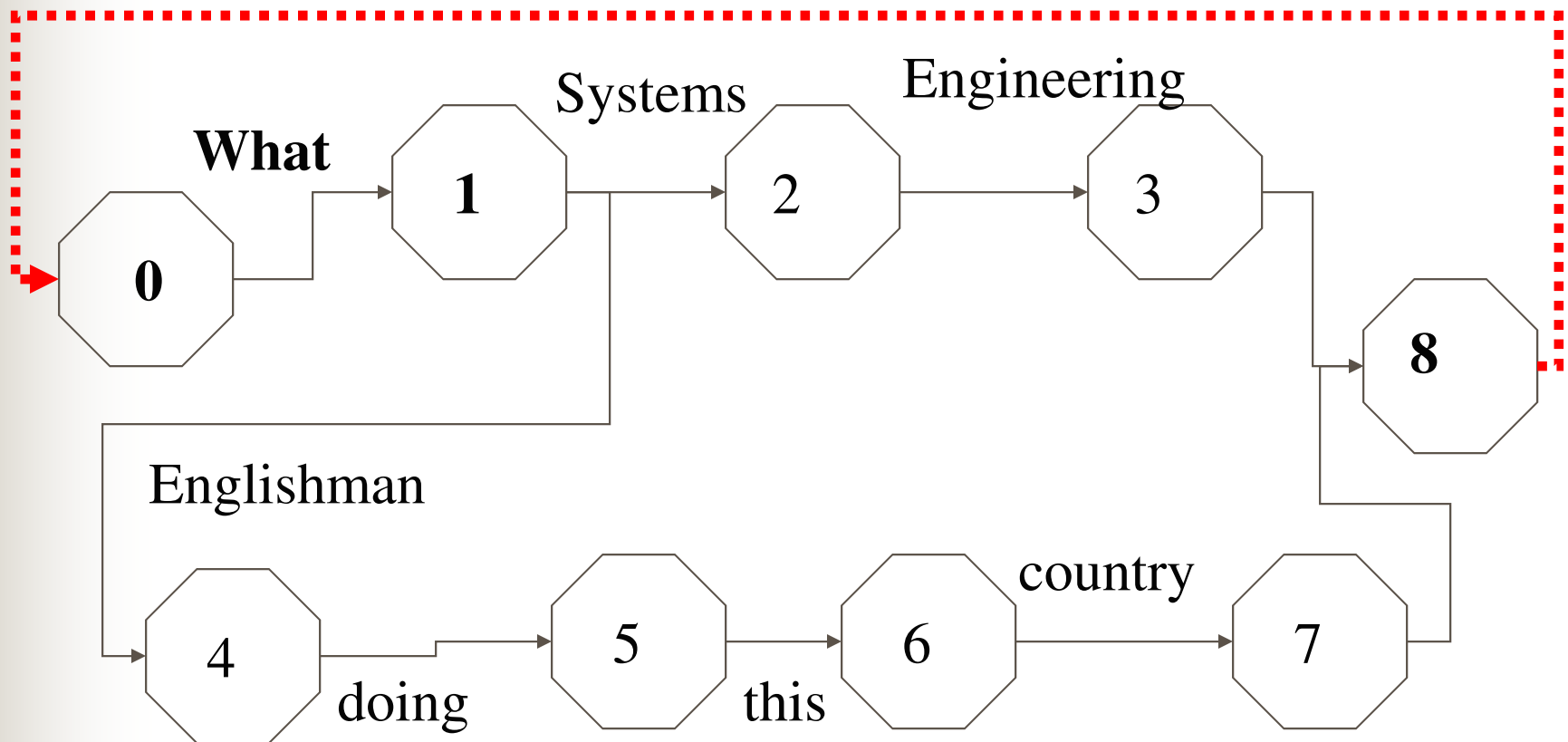
Automating QSOs



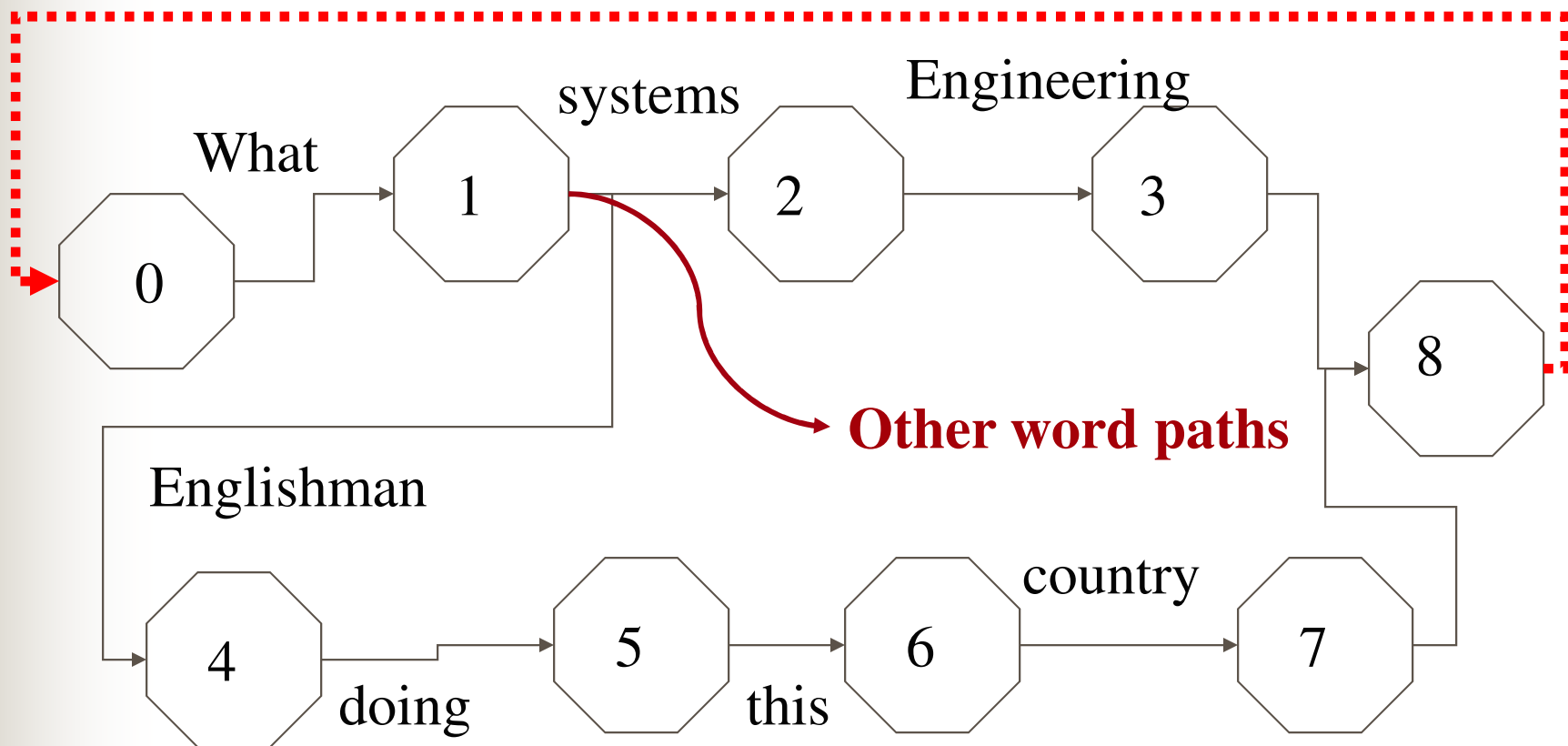
Automating QSOs



Automating QSOs



Automating QSOs



State functions

- Do nothing/ wait for another word
- Send a file
- Turn transmitter on and send a file
- Send a file, then turn transmitter off
- Execute a program
- Overlay state table

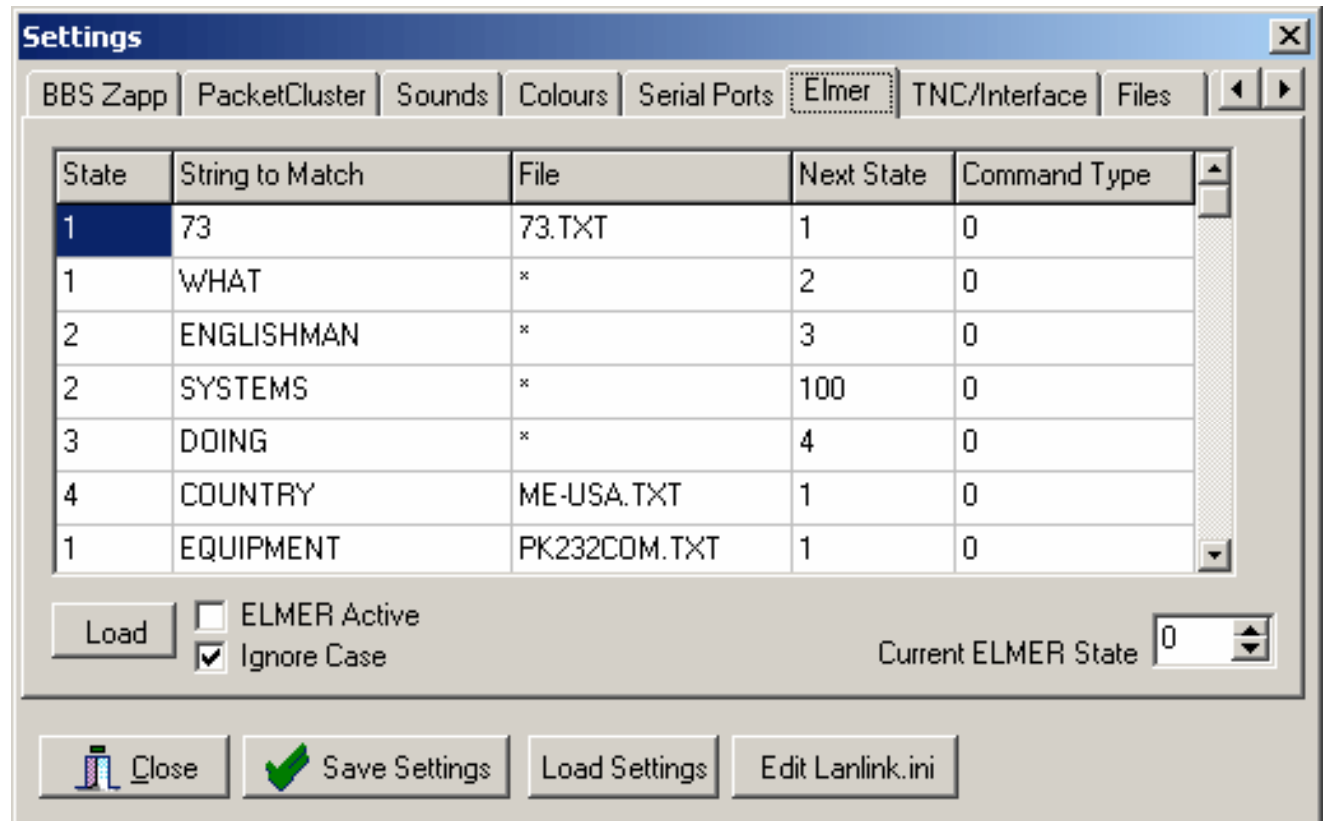


State table - section

State	Word	Function	Next state	File	Repeat
0	What	nothing	1	N/a	Yes
1	systems	nothing	2	N/a	No
1	Englishman	Nothing	4	N/a	No
6	country	Send file	7	Country.txt	No



Elmer



“ELMER: An Expert System Based on a Finite State Machine”, *AMSAT Symposium*, Washington DC., 1992



The Internet

- **Provided “wormholes”**
- Replaced message aspects of packet radio
- Providing new ‘voice bands’
 - IRLP
 - Echolink
- Provides video and audio QSOs
- Providing experiment features via remote receivers
 - W4MQ and W7DXX
- Low cost



Partial list of Nodes available via the WA3NAN Node circa 1993

BLWNDE:VK3BLW-2	BOWR48:VK2XDM-2
BRADIP:WB9UUS	CHAYER:N3BBF
CNBBPQ:F6CNB	DCA1:K3AF-1
DXWHO:VE7CC-3	EDUBBS:PP5UF-8
EHQBBS:VK2EHQ	EWABBS:KB3RM
EZF:KC4ASF-3	EZFBB:KC4ASF-1
GIN48:VK1RGI	
GLSBPQ:KG5RG-3	
HAISIP:VK3ERM-3	HGN:W3BRZ-9
HNL:KJ9U	HOCobb:NB3P
HOLD2:VK3RPS	HOLD70:VK3RPS-7

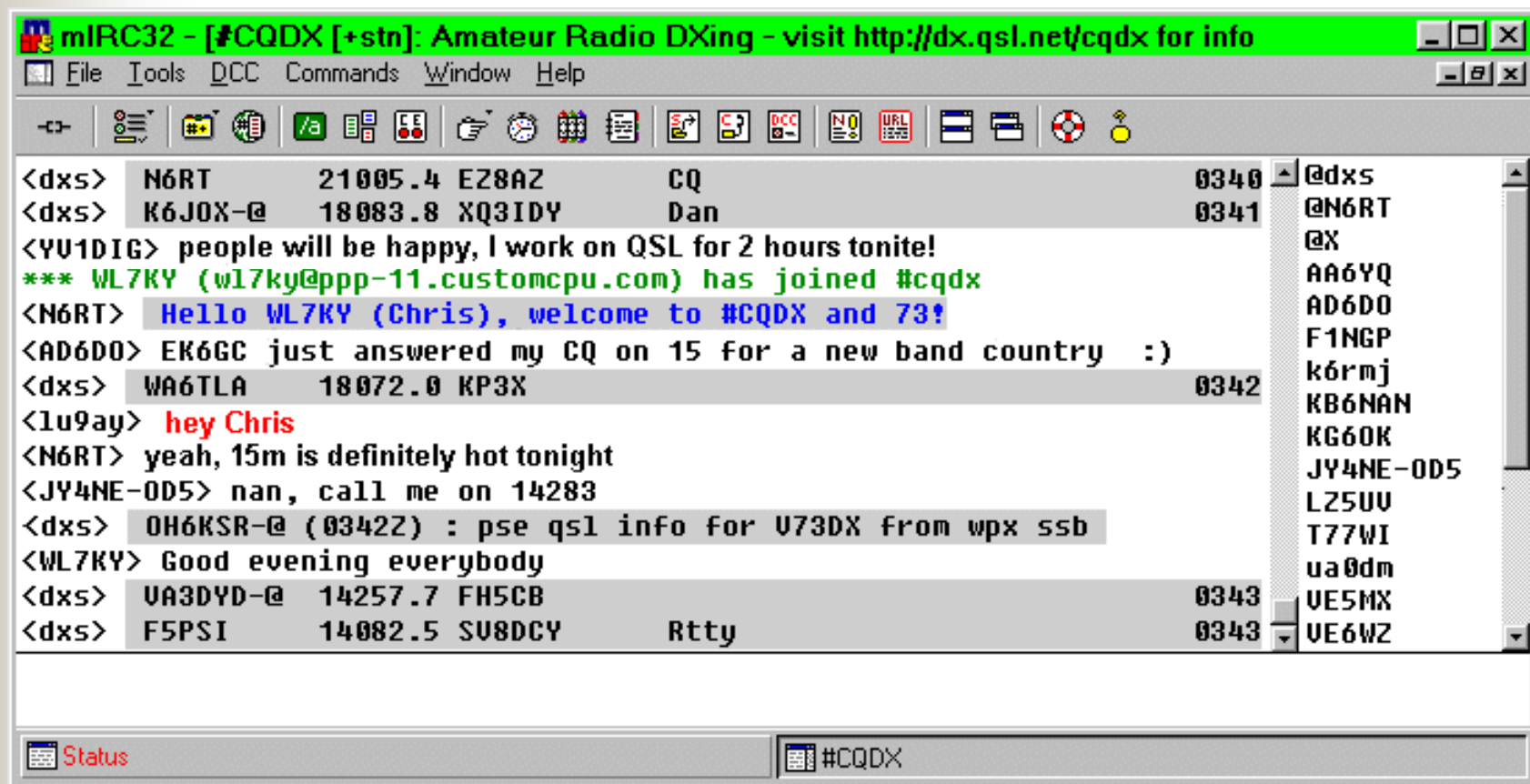


The Internet

- Provided “wormholes”
- **Replaced message aspects of packet radio**
- **Providing new ‘voice bands’**
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- **Provides video and audio QSOs**
- **Providing experiment features via remote receivers**
 - **W4MQ and W7DXX**
- **Low cost**



IRC chat sample



InternetLink

```
InternetLink Version 0.1
Host 208.239.240.147:7000 Port 7000
Connect Disconnect Connected Reduce
This is the WR3D (ex N2TLY) DXCluster system using DXSpider software
If your terminal doesn't echo characters, please set the 'local
echo' option (this is only likely to affect Microsoft users)
login: g3zcz
*** Connected to WR3D in Baltimore
Hello Joe, this is WR3D in Baltimore MD, USA
running DXSpider V1.49 build 56.948
**** This server is likely to be replaced ****
**** it may go out of service at any *****
**** time. It could be a whole day *****
=====
14007.9 HC2SL 18-Jul-2002 02312 <DL6NEC>
7004.0 5K0Z 18-Jul-2002 02292 he's back... up... <K8LH>
14260.0 CU9X 18-Jul-2002 02232 IOTA EU089 <W6TG>
10112.7 F/DJ7TO/P 18-Jul-2002 02202 <K2MPY>
14013.0 3G1A 18-Jul-2002 02082 QSX 14014.50 <PR7AR>
-----
Date Hour SFI A K Forecast Logger
18-Jul-2002 00 180 18 3 MODERATE W/S2&R2 ; MINOR W/G1.S1&R1 LVLS <K3SKE>
=====
Cluster: 2 nodes, 1 local / 1 total users Max users 2 Uptime 7 13:12
G3ZCZ de WR3D 18-Jul-2002 0232z >
```



Iphone



- Vocaltec
- Audio and video QSOs
- Audio repeater wormholes
- Small screen
- No longer supported
- Use Microsoft's Netmeeting for the same functions
 - Need IP address



IRLP



- <http://www.irlp.net/>
- Internet Radio Linking Project.
- Voice over IP
- Links > 700 vhf/uhf repeaters worldwide
- Dial-up tone control access
- VK5 Node 650



Echolink

The screenshot shows the EchoLink software interface for station VK5WU. The window title is "EchoLink - VK5WU". The menu bar includes "File", "Edit", "Station", "Tools", "View", and "Help". The toolbar contains various icons for functions like search, connect, and help. The main display area shows a list of 308 stations on server1.echolink.org, with 15% being busy. The list includes columns for Station, Stat, Time, Location, and Node. Two stations, VE3JULV and VE7HUB, are highlighted in yellow. Below the list are two scrollable areas for "Stations On/Off" and "Stations Busy/Free". The status bar at the bottom indicates "Not connected" with a "Send" button and a "Ready" indicator.

Station	Stat	Time	Location	Node
VE3JCH	On	22:26	Pembroke Ont. Canada	11765
VE3OKS	On	22:24	Barrie,ontario,ca	2376
VE3JULV	On	22:26	Erieau,on,canada	7008
VE7CZV	Busy	19:25	I Will Call You Back	24094
VE7DGM	Busy	19:18	Sidney, B C	27198
VE7HUB	On	19:25	Coquitlam,b.c.	5477
VE7LAA	Busy	19:24	Horsefly Bc	17715
VE7LVE	On	19:28	Chilliwack B.c.	26102
VE7NRO	On	19:24	Victoria, Bc, Canada	26854
VE7ONE	On	19:22	Malahat, B. C. Canada	14068
VE9MMB	On	23:28	Shediac Nb Canada	15797

Stations On/Off

- 03:27:29 GM0WDF off
- 03:27:29 AB5CC off
- 03:27:29 CT1EJC-L off
- 03:27:29 WB5UGT-R off
- 03:27:29 KA4FFP-R off

Stations Busy/Free

- 03:27:29 KF4GGU busy
- 03:27:29 KT4IK busy
- 03:27:29 WA2FDU free
- 03:27:29 WB4LHD busy
- 03:27:29 WB6ZKC-L free

Not connected
Last connection: *2E1EHM*

Send

Ready



More Echolink

The screenshot shows the EchoLink software interface for station K1RFD-L. The main window displays a list of 201 stations on the link1.co.uk network, with 14% being busy. The list includes columns for Station, Stat, Time, Location, and Node. A 'Station Summary' window is open, showing statistics for Repeaters, Links, Users, and Conf Svrs, along with a breakdown by country. A 'Connection Statistics' window is also open, showing details for the current connection to GB3BN-R, including sent and received packets and audio status.

	Free	Busy	Total
Repeaters:	33	8	41
Links:	68	7	75
Users:	55	15	70
Conf Svrs:	15	0	15
Total:	171	30	201

K1RFD - (monitoring) 192.168.100.108	
GB3BN-R	
Sent	Received
Control Packets: 39	Control Packets: 34
Data Packets: 353	Data Packets: 233
Net: _____	Out of Sequence: 0
Audio: _____	Missed: 1



More Echolink

The screenshot displays the EchoLink software interface for station K1RFD-L. The main window shows a list of 201 stations on the link1.co.uk network, with 14% being busy. The interface includes a menu bar (File, Edit, Station, Tools, View, Help), a toolbar, and a status bar at the bottom indicating 'Connected TX SIG'.

Station Summary

	Free	Busy	Total
Repeaters:	33	8	41
Links:	68	7	75
Users:	55	15	70
Conf Svrs:	15	0	15
Total:	171	30	201

Connection Statistics

Station	IP Address
K1RFD - (monitoring)	192.168.100.108
GB3BN-R	

Sent

Control Packets:	39
Data Packets:	353
Net:	
Audio:	

Received

Control Packets:	34
Data Packets:	233
Out of Sequence:	0
Missed:	1

Station List (Main Window)

Station	Stat	Time	Location	Node
VK5SX-L	On	12:18	Adelaide - Sth. Australia	20043
KLONE-L	On	18:48	Anchorage Alaska	4604
KG4LVO	Busy	22:50	Andrews,n.c.	22023
N5ECG-R	On	21:50	Arlington, Texas	15896
KG4LEY-R	Busy	22:49	Augusta.ga Rptr 145.290	17579
W1PIG-R	On	22:51	Augusta.me 146.700/443.200	15061
W3TNT	On	22:51	Away From Computer	13989
KB7YQY-R	On	22:48	Battle Creek Mi	13354
WA2LIP	On	22:53	Bay Shore, N.y.	22266
KB8GYU-L	On	22:51	Belpre Oh 146.745 Rptr	9323
WB4FAY-L	On	21:51	Birmingham, Al Usa 147.28+	7148

Stations On/Off

22:52:55 N3DE on: Glen Burnie, Md Usa
22:52:55 N6SPT on: Walnut Creek Calif. Usa
22:52:55 K5OKC off
22:52:55 W4TTH off
22:52:55 W1CDO off

Stations Busy/Free

22:52:55 KG2PD busy
22:52:55 W2NQS busy
22:52:55 WA2LIP free
22:52:55 IK0HKA-L busy
22:52:55 N3QZR-L free

Connected to: GB3BN-R
United Kingdom

Ready

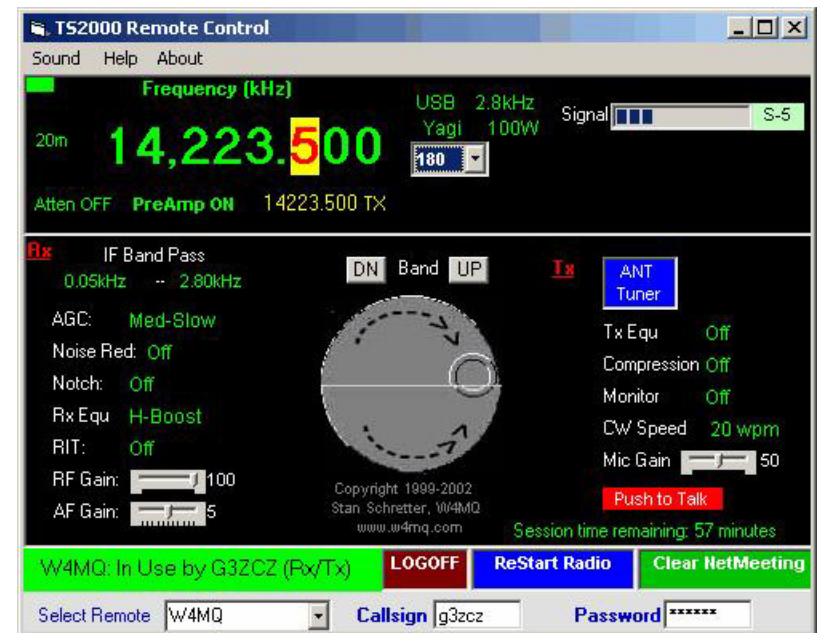


VK3UR, W4MQ and W7DXX/1



W4MQ and W7DXX/1

- Regular QSOs
 - Internet delays
- Sweepstakes contest
 - QST July 2002, p94.
- Thunderstorm at G3IOR
- Work yourself in many places?



Topics

- Conventional amateur radio
- Introduction of computers
- OSCAR
- Digital communications
- Automating Communications
- The Internet
- **The future?**
- Concerns
- Discussion



The future?

- Electronic QSLs
 - Text emails?
 - letters
 - Pictures via email?
 - QSL cards



The future?

- Electronic QSLs



The future?

- Electronic QSLs
- **Interplanetary communications**



**[young] G3ZCZ at
Comsat Labs, with
OSCAR 7 Mode B
Communications
Terminal, donated by
Comsat to World Boy
Scouts HQ, Geneva**

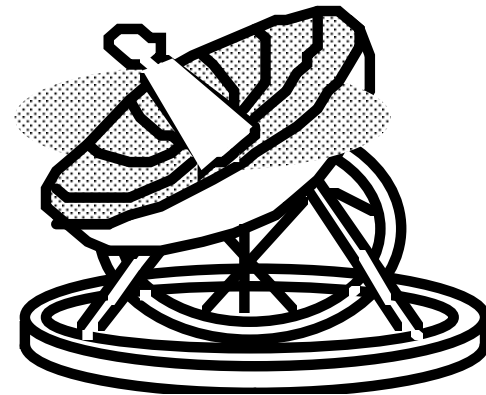


GATEWAYS TO THE 21ST CENTURY

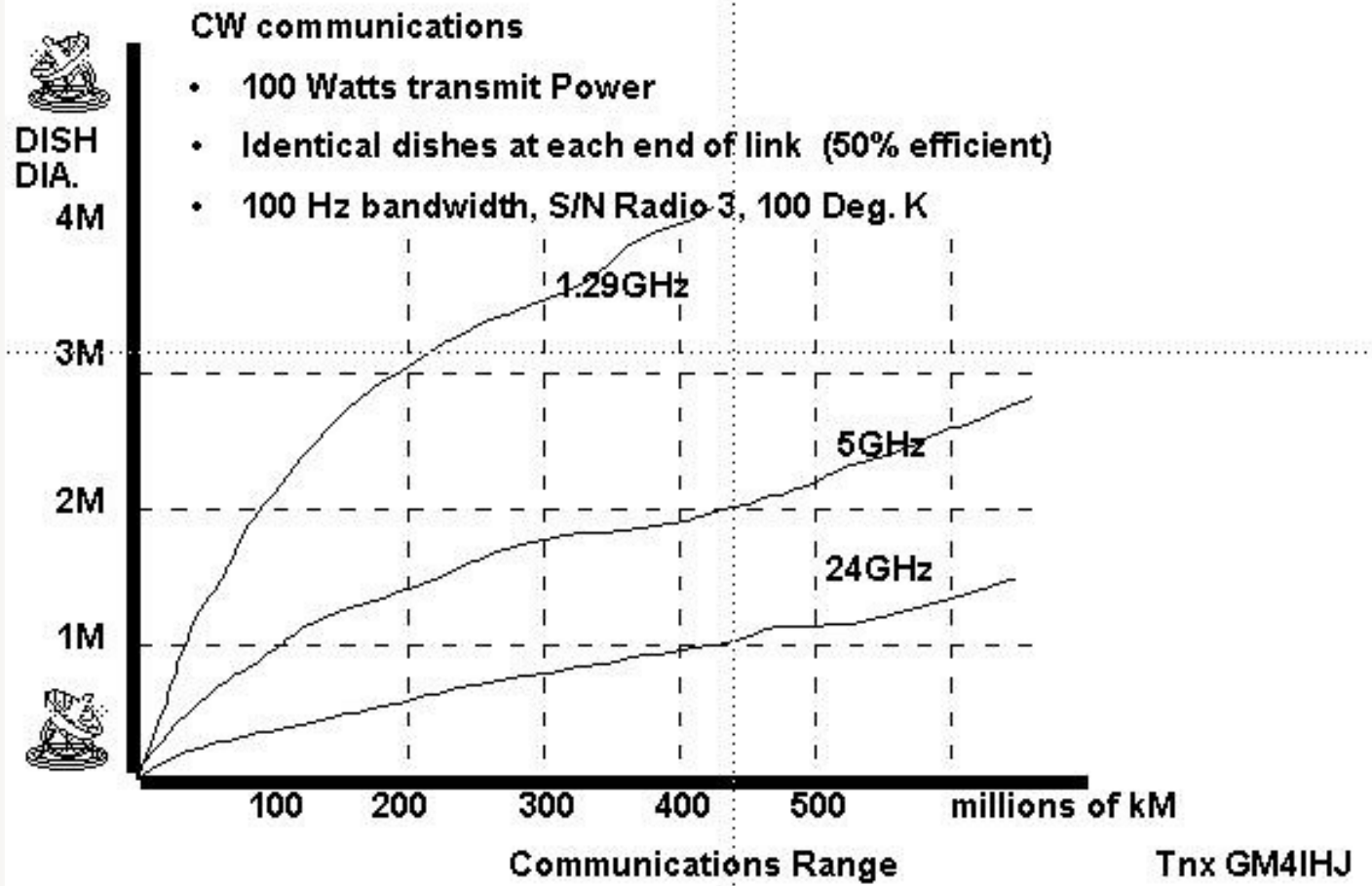
JOE KASSER, G3ZCZ

AMSAT-NA SPACE
SYMPOSIUM

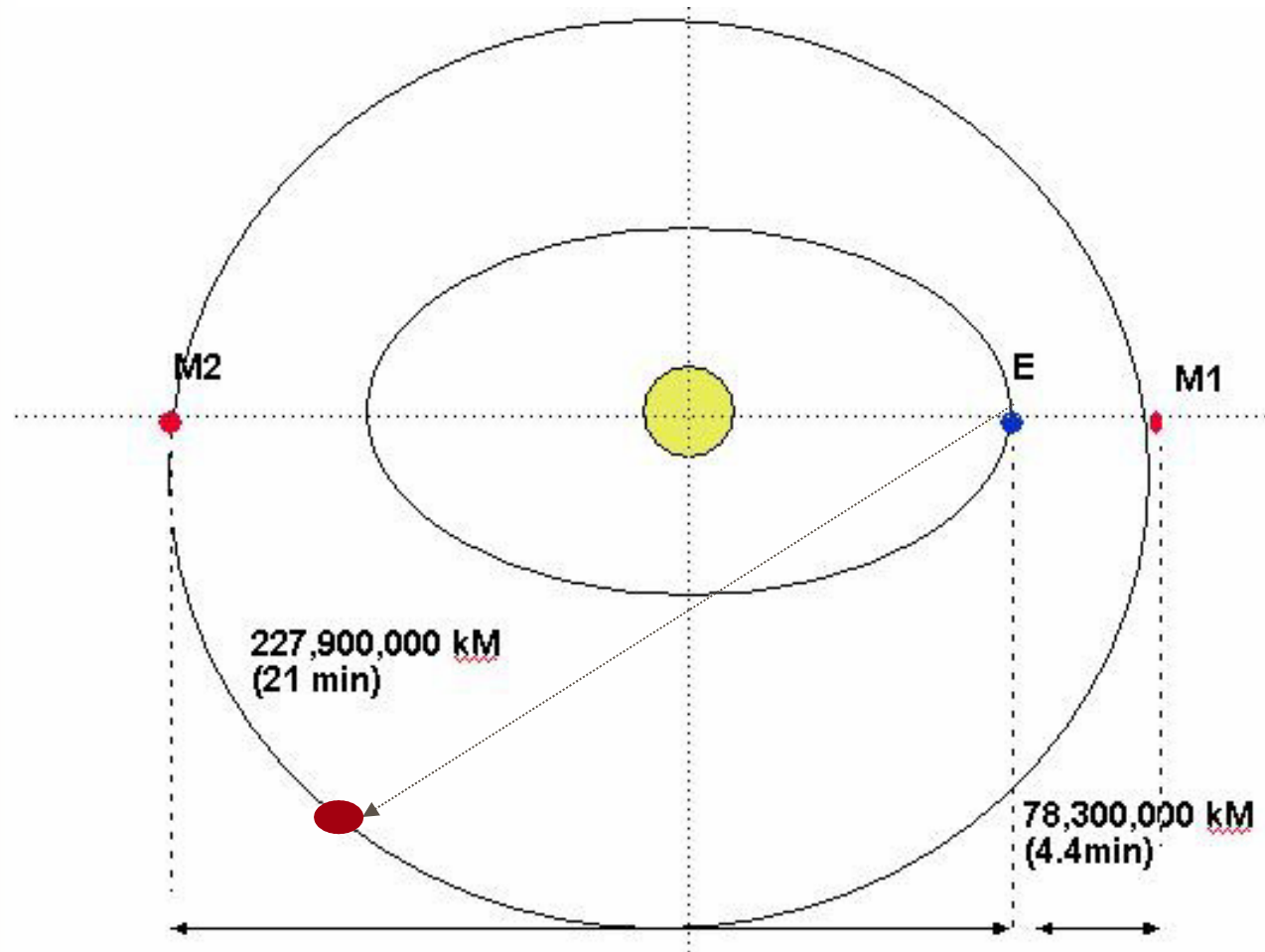
NOVEMBER 1991



Microwave ranges

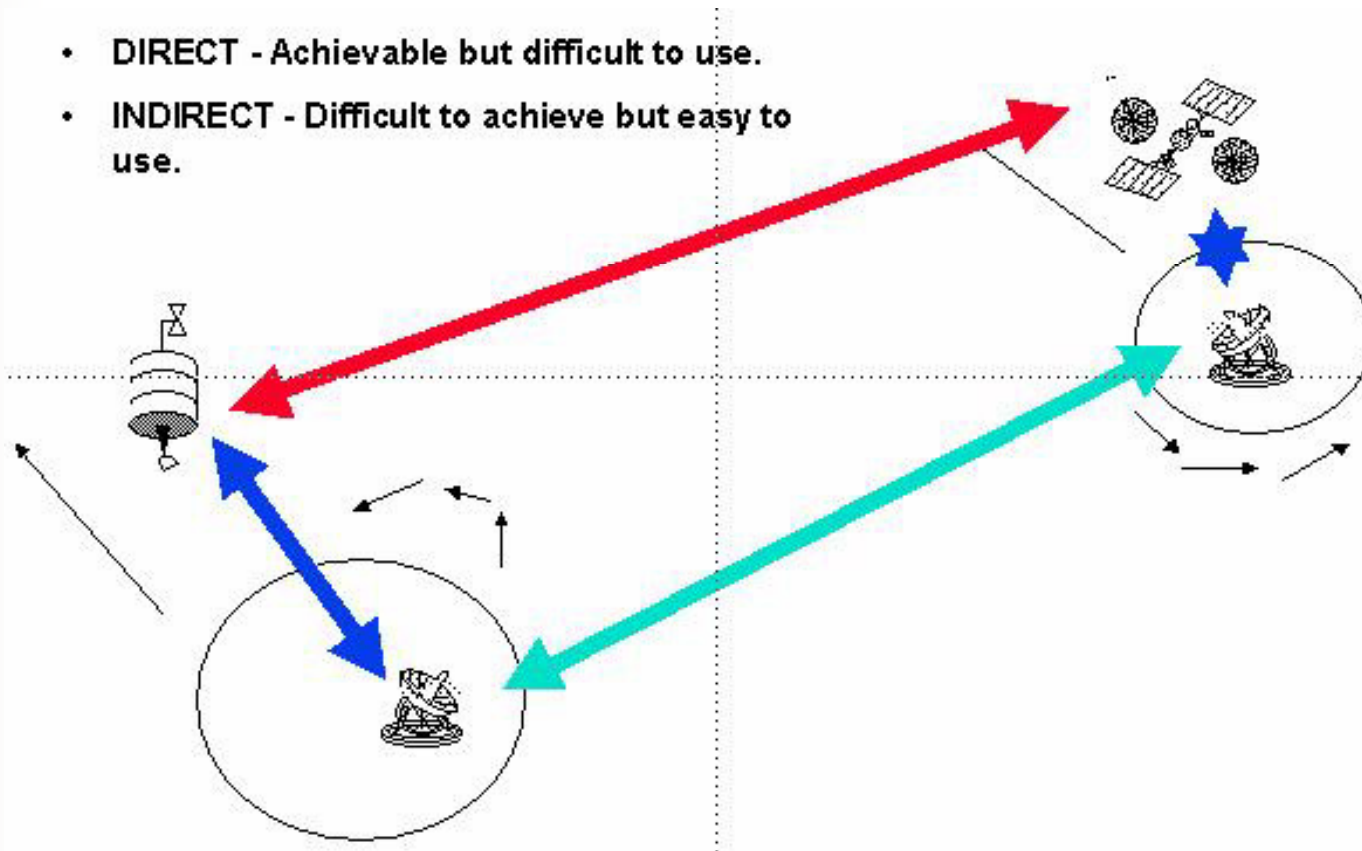


Earth – Mars links

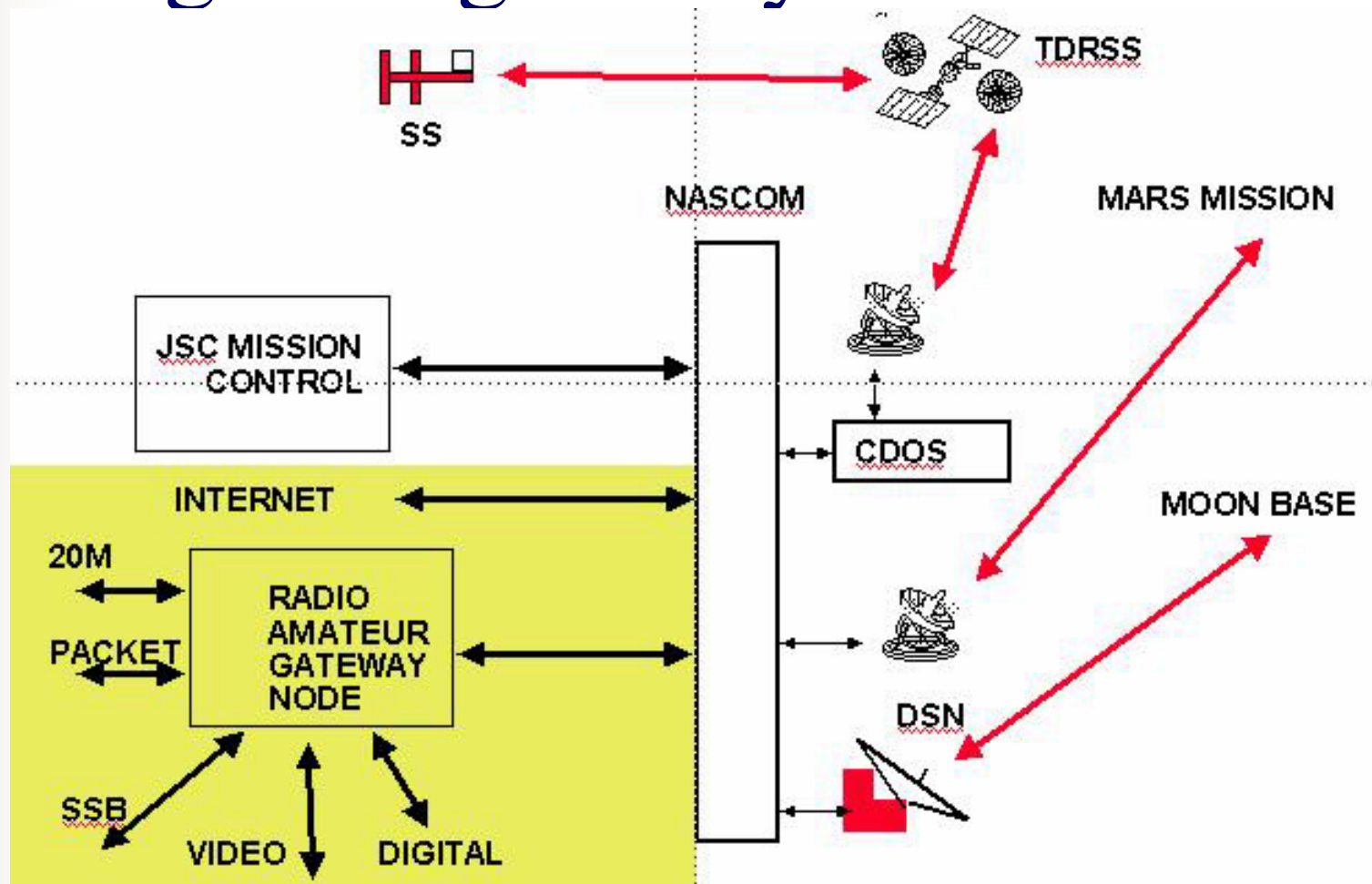


Interplanetary communications

- **DIRECT** - Achievable but difficult to use.
- **INDIRECT** - Difficult to achieve but easy to use.



Integrated gateways



The future?

- Electronic QSLs
- Interplanetary communications
- **Hybrid Internet-Radio links**
 - IRLP, W4MQ, new types
- **Need new cost-effective applications**
 - 20th Century
 - Communications
 - 21st Century
 - Something different
 - Experimentation and education?



Concerns-1

- Before about 1980 amateur radio led the way
 - Short wave propagation
 - Emergency communications capability
 - ELT for downed aircraft
 - Capabilities of LEO communications satellites
 - Etc.



Concerns-2

- Post 1980 amateur radio seems to be following
 - Packet radio introduced and provided Internet capability to radio hams, but was overtaken by the growth of the Internet
 - Current spread spectrum experiments in USA
 - HF modes of communications
 - PSK-31, MFSK



Concerns-3

- **Need new services [for microwave bands] that do not try to duplicate Internet capability nor try to duplicate hf/vhf functionality**
- Need to focus on non-communications functions of amateur radio
 - Experimentation
 - Spacecraft telemetry
 - Education
 - Etc.



Microwave bands

- Amateur vhf/uhf/microwave spectrum is shrinking
 - Personal communications are absorbing spectrum
 - Amateur hf spectrum is growing slightly
 - Professionals move to vhf/uhf/microwave
- Microwaves are not conducive to multi-point QSOs
- QSOs are local
 - even with repeaters, except via OSCAR
- Cable losses are high compared to hf



Comparisons for communications

■ Radio links

- RF equipment
- Antennas
- Purchase price
- Audio - World-wide
- Local video -
uhf/microwave
- QRM

■ Internet

- No RF equipment
- No antennas
- Monthly ISP costs
- Audio and video -
World-wide
-
- No QRM

Cellular telephones provide local service for simplex single QSOs



Experimentation

- Layered software
 - Well defined interfaces
- Application layer
 - LanLink
 - traditional communications and databases
- Communications layer
 - Voice card modems
 - psk31 etc.



Modular approach to developers

- Think about why new modes catch on
- Instead of developing one aspect well and others in mediocre manner because the users want them
- Focus on what you can do well
 - Eg. AE4JY's PSK31CORE.DLL
- Leave other aspects to those who do them well
- User can plug and play

Summary

- Conventional amateur radio
- Introduction of computers
- OSCAR
- Digital communications
- Automating Communications
- The Internet
- The future?
- Concerns



Software for Amateur Radio 2001



Discussion

- <http://therightrequirement.com>
- <http://www.w4mq.com>
- <http://www.echolink.org>
- <http://www.eqsl.org>
- <http://www.satscape.co.uk>
- <http://www.irlp.net/>
- <http://www.taborsoft.com/abw/>
- <http://www.qsl.net/mmhamsof/>
- <http://www.qsl.net/g4ilo>
- <http://www.arrl.org>
- <http://www.rsgb.org>
- <http://www.wia.org.au>

