The RSGB PSC

International Beacon Monitoring Project

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RADIO propagation prediction is understandably a very emotive subject for a lot of keen amateur radio operators, not least among members of the RSGB Propagation Studies Committee (PSC). During a PSC meeting in 1999 it was noted that the *RadCom* propagation predictions had not been as accurate as they perhaps should have been. As proof of this, the reception of beacons in the NCDXF / IARU International Beacon Network was noted.

The Northern California DX Foundation (NCDXF), in cooperation with the International Amateur Radio Union (IARU) constructed and operates a world-wide network of high-frequency radio beacons on 14100, 18110, 21150, 24930, and 28200kHz.

After careful consideration, the author decided to initiate a PSC project using the NCDXF beacon chain to increase *RadCom's* prediction accuracy. A radical approach was needed.

THE PROJECT

IT WAS DECIDED to split the project into two parts. The first part was the information-gathering exercise and the second part the programming and automation side. *RadCom* assisted with the first part in as much as the editor inserted an advertisement asking for volunteers to listen and report reception of the beacons in the chain. The reporting team consists of G3PEM, G0IHF, G4WWA, G0KYA, M0AOG and myself.

The first results were received for July 2000. Initially, I designed an *Excel* spreadsheet and those who had computers either e-mailed me the monthly reception reports or sent me a diskette with the information on. Later, Alan Messenger, G0TLK, adapted his *BeSpeak* program [see WWW. below - *Ed*] so that the information was automatically captured to disk when the relevant program button was clicked.

As the reporting team is spread across the country, I receive a good geographical spread of beacon reception and therefore a good average for the UK. The information I requested was: date, time, band, beacon, S-meter reading and any special comments. As I requested the data to be sent to me each month, I was eventually able to verify the *RadCom* predictions against actual reception reports. The NCDXF beacon chain was selected for this purpose because it gave five-band coverage and had 18 beacons spread around the globe. One drawback is that not all the beacons are on the air all the time.

	Time												
Beacon	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
4U1UN			1	1				1	1	6				1	1		
4X6TU		1	2	1				2	3	5	5			1			
5Z4B														1			
CS3B		1	3	1		1		2	2	2	2		4	2	2		
JA2IGY			1														
KH6WO			1														
LU4AA			1	1													1
OH2B		7	4	6		6		4	5	7	7						
RR9O				2		1				2							1
VE8AT			1	1		1		1	1	2	1		1				1
W6WX			1								1						
YV5B														1			
ZL6B		1	1	1		1		1	1	1							

Fig 1: Analysed data for 14MHz. Only the hours that were reported are shown here.

MONTHLY RESULTS

ONCE THE REPORTS have been received I read them into an *Access* database, which has been programmed to analyse the data into a meaningful format.

An example can be seen in **Fig 1**, which shows the beacons heard during December 2001 on 14MHz. Missing hours represent times where no monitoring took place. What I end up with is a list showing all the bands monitored with S-meter readings against the beacons heard at the relevant time. Further examples are on my website (see WWW. below).

Now comes the radical approach! Instead of looking for a prediction program that produces the same results as those in my database, I change the parameters that the prediction program uses in order to obtain the desired results. The ITS HF Propagation, REC533 program is used, not because it produces the most accurate results, but because it has the most comprehensive (and complicated) set of parameters that can be manipulated by a separate program.

Currently I have 60,000 entries on my *Access* database for these beacons; this will grow steadily in the future. The database should be sufficient to verify the accuracy of propagation predictions programs.

Monitoring the beacon chain has thrown up some anomalies, such as the extreme reliability of the South African beacon, ZS6DN, on 28MHz. I believe this is due in part to a number of special circumstances, for example the reliability of the North - South path, and / or the 'Equatorial Anomaly'. By adjusting the prediction parameters for this path, this special reliability can be catered for.

AUTOMATION

THIS IS WHERE my good friend and colleague Dr J Sylvan Katz, G0TZX / VE5ZX, comes in. Sylvan has been responsible for producing the logic and programming so that all I need to do is alter certain parameters for each destination that is being predicted.

Changing such parameters as aerial type, power output, SSN, etc have a profound impact upon prediction output. Each month I produce beacon predictions for the following month. When that month's results are available, I merely compare them. If they are incorrect I play with the parameters until the results are the same and keep a record of the new parameters. In this way, month by month I find that there are fewer and fewer changes to make, proving that I'm on the right track.

RadCom readers who take note of the HF F-Layer Propagation Predictions should have noticed a gradual improvement in prediction accuracy since the inception of this project. For those hours that I do not receive reports, I merely use the program to extrapolate the most logical results.

Because of the need to predict three months ahead for *RadCom* purposes, the increase in accuracy is necessarily a little way behind that which I am able to achieve during a given month. This project is scheduled to continue until August this year, when I should have all the data necessary to verify that the predictions are as accurate as possible. It is expected that from time to time thereafter accuracy will be tested perhaps by the use of G0TLK's program, which has a completely automated routine and can be used in unattended mode. ♦

WWW.

NCDXF / IARU International Beacon Network **www.ncdxf.org/beacon.htm**
***BeSpeak* (Alan Messenger, G0TLK)** **www.alangm4.clara.net**
Gwyn Williams's, G4FKH, site: **www.g4fkh.demon.co.uk/NCDXF/Table.htm**

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