SSN = 75 (CCIR)

Propagation HF January 2012 (Southern Norway)

100 W CW and 3 dBi antenna gain

Bold font: **good quality**. Normal font: Need up to +10 dB gain. *Italic: need 10 - 20 dB gain*. Green: best time. Underline: long path

Station	Time (UTC) 01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
W2 New York	**40**	**40**	**40**	**40**	**40**	**40**	**80**	**40**	**40**	**40**	**30**	**20**	**17**	**17**	**17**	**17**	**17**	**20**	**30**	**30**	**40**	**40**	**40**	**40**
W6 San Francisco	**30**	**30**	**30**	**40**	**40**	**40**	**40**	**40**	**40**	**30**	**30**	**30**	40	30	**30**	**20**	**20**	20	30	30	30	30	**30**	**30**
KH6 Hawaii	20	30	**30**	**30**	**30**	**40**	**40**	**30**	30	30	**30**	**30**	**30**	**30**	**40**	30	**20**	**20**	20	20	*20*	*20*	*20*	*20*
ZL Wellington	-	-	-	-	-	*20*	17	**17**	**17**	**17**	**17**	**17**	**20**	**20**	**30**	**30**	30	30	17	*20*	-	-	-	-
VK Perth	-	-	-	-	-	*15*	12	**10**	**10**	**10**	**10**	**12**	**15**	**15**	**20**	**20**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	30
JA Tokyo	30	*30*	-	*30*	*30*	30	20	**17**	**20**	30	30	40	30	**30**	**30**	**40**	**40**	**40**	**30**	**40**	**40**	**30**	**30**	30
VR Hong Kong	**40**	40	-	-	-	*17*	15	**12**	**15**	**15**	**17**	**20**	**30**	30	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**
YB Jakarta	40	-	-	-	-	15	**15**	**12**	**12**	**10**	**12**	**12**	**15**	**15**	**20**	**20**	**30**	**40**	**40**	**40**	**30**	**30**	**30**	40
4S Colombo	**40**	**40**	30	*30*	*20*	17	**12**	**12**	**12**	**12**	**12**	**15**	**15**	**17**	**20**	**30**	**40**	**30**	**30**	**30**	**30**	**30**	**30**	**40**
ZS Pretoria	**30**	**30**	**30**	**30**	**30**	**20**	**15**	**12**	**10**	**10**	**10**	**10**	**12**	**12**	**15**	**15**	**20**	**20**	**30**	**30**	**30**	**30**	**30**	**30**
5Z Nairobi	**30**	**40**	**30**	**30**	30	**17**	**12**	**15**	**10**	**10**	**10**	**12**	**10**	**17**	**12**	**15**	**30**	**20**	**40**	**30**	**30**	**30**	**30**	**30**
4X Tel Aviv	**30**	**40**	**40**	**30**	**40**	**17**	**12**	**17**	**15**	**15**	**15**	**17**	**10**	**17**	**20**	**17**	**20**	**40**	**30**	**30**	**30**	**30**	**30**	**30**
CT3 Madeira	**30**	**30**	**30**	**30**	**40**	**40**	**40**	**17**	**20**	**17**	**17**	**15**	**15**	**15**	**10**	**17**	**20**	**17**	**40**	**40**	**30**	**30**	**30**	**30**
LU Buenos Aires	**30**	**30**	**30**	**30**	**40**	**40**	**30**	**20**	**20**	**15**	**20**	**12**	**12**	**12**	**12**	**12**	**15**	17	17	20	30	**30**	**30**	**30**
OA Lima	**40**	**40**	**30**	**30**	**40**	**40**	**40**	**30**	**30**	30	**17**	**12**	**10**	**10**	**10**	**10**	**15**	17	*17*	*20*	30	30	30	**40**
YV Caracas	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**40**	**30**	**30**	**17**	**17**	**15**	**12**	**15**	**15**	**15**	17	20	30	**40**	**40**	**40**	**40**

Produced 28/11/2011 by LA5MDA Bjørn Henrik Vangstein. Based on VOACAP version 07.1025I (with method 30)

DEFINITION OF AN EXPECTED OPENING

Expected openings are defined as SNR >= 24 dB (a), MUFDay >= 50% (b) REL >= 50% (c)
Multipath tolerance 10 dB, multipath delay tolerance = 0.85 ms (which is rather tolerant).

a) Required SNR is taken over 1 Hz bandwidth. This equals SNR = 0 dB with 250 Hz bandwidth filter and demodulation.
b) MUFDay is the fraction of days where the frequency is below MUF for the given date and hour. 50% means 15 days pr month.
c) REL means the fraction of days where the SNR is equal or above required SNR for the given date and hour.

Locations

The locations/QTHs used are the same as in the NCDXF beacon network for easy comparison with real life propagation on 20, 17, 15, 12 and 10 m. (Finland and Ural was omitted, and Jakarta was added.) The VOACAP input parameters are verified with long term real on-air measurements using vertical antenna (R-8), Windom FD-4, Kenwood TS-930S transceiver and logging with Faros (ver 1.0) NCDXF beacon software.

SSB versus CW

As indicated, the forecast is calculated for CW communications. In VOACAP the limit where CW communication is possible is set to SNR = 0 dB after filtering and demodulation. Several factors are taken into account when this limit was set – both the required bandwidth with this modulation and the nature of the signals readability. If you can communicate with CW, communication with PSK31 and RTTY is also possible. Theoretically PSK31 need less bandwidth and hence less signal strength, but often the power used in PSK31 is less than (maybe 20 – 50 %) on CW. Hence calculations for CW also apply to digimodes. SSB is a more demanding mode. Because it requires more bandwidth and is less explicit to read, more than 10 dB must be added to the circuit. Hence this forecast is too optimistic for SSB, but neither power, antennas nor modes influence the choice of best band.

VOACAP INPUT PARAMETERS

Transmitter antenna: Isotropic antenna with 3 dBi gain, minimum 1 degrees radiation angle
Receiver antenna: Isotropic antenna with 3 dBi gain, minimum 1 degrees radiation angle
Transmitter power: 100 W
Noise: - 150 dBW/Hz at 3 MHz (Rural environment)
Fprob: I have used the default E-, F1- and F2-layers settings (=1), but have not included sporadic E-layers. Sporadic E-layer effects have been taken into account where I have real life measures that imply that this tends to occur often.

Absorption model: Propagation predictions for 11/2007 and later are calculated with the old IONCAP absorption model because this corresponds better with practical on air experience.

Discussion of the input parameters: Choice of antenna and power

Several set of input parameters have been tested and compared with real life signals from the NCDXF Beacon Network. Real life antenna models have also been tested with the 'HF Ant' software in VOACAP, but the isotropic antenna with 3 dBi and 100 W feed point power was the setting that matched the on air measurements best. Other arguments for choosing an isotropic antenna are:

- We do not know what kind of antenna the opposite station uses before we happen to make contact
- We do not really know what kind of characteristics our own antennas have - it's difficult to measure and you might have more than one.
- It is better to cover all possibilities (modes) and try than to exclude one that actually was possible
- The type of antenna and gain does not influence the MUF and probably not the best band unless you have a monobander which strongly is favouring one band.

If you have more gain (better antenna or more power) the openings might begin earlier and close later.

About the input parameters: SSN

- The SSN used is the one that is predicted for the actual month.
- If the actual SSN is significantly higher over a period of many days, a higher band might be open. The openings at a given band might begin earlier and end later.
- If the actual SSN is significantly lower over a period of many days, a lower band might be a better choice. The openings at a given band might begin later and end earlier.