Long-Term Propagation Planning
Carl Luetzelschwab K9LA April 2017

Thinking back over my DXing and contesting efforts throughout the years, I've come to realize that I've run the gamut with respect to propagation planning. There were times when I did no propagation planning at all. There were times when I did short-term propagation planning (events in the very near future). And now I seem to be doing more long-term propagation planning (events in the distant future). This scenario seems to follow my ascension up the DXCC (DX Century Club) and WAZ (Worked All Zones) ladders.

Although I was licensed as a Novice in 1961, my DXing efforts (and contesting efforts) didn't start until the middle 1970s. That's because I didn't have much of a personal station early on, and then five and a half years at Purdue (BSEE and MSEE) and active duty in the US Army pretty much kept me from having a permanent station. My early DXing and contesting efforts were as a guest op at stations in the Chicago area when I started working for Motorola after college and my military obligation was over. A subsequent transfer with Motorola to Texas allowed me to buy a house and put up a tower. This move was a huge boost to my DXing and contesting activities.

Those early DXing and contesting years were when I didn't do any propagation planning at all. Heck, I'd just sit down at the radio (now known as BIC time – Butt-In-Chair time) when I had the opportunity. It didn't matter where and when the band was open – I'd just work what I heard. The DXCC entities (and WAZ credits) slowly built up. As a side note, it was these early efforts that proved to me that contesting was a great way to add DXCC entities and WAZ zones to my totals.

Beginning in the early 1980s, my contesting efforts (including efforts from the DX side) became much more serious. Additionally my wife Vicky and I participated in DXpeditions to Syria (YK9A) in February 2001 and to Market Reef (OJØ) in July 2002. During this period I began doing short-term propagation planning. To reiterate, short-term propagation planning means for events in the very near future.

For example, I did predictions for my 1982 K9LA/V2A CW operation in the ARRL 10-Meter contest. I needed to know when and where I needed to manually swing the 3-element Yagi on the roof of the hilltop hotel/casino that I operated from in St. John's. Another example is when I ran predictions for the two above-mentioned YK9A and OJØ DXpeditions to make sure we gave the entire world an opportunity to work us.

During this period I also ran many propagation predictions for DXpeditions by others. Most of these DXpeditions had their dates already cast in concrete, so short-term predictions were adequate.

But a few of these DXpeditions asked "what's the best time to go?" That was somewhat dependent on their goals – did they want to favor the higher bands, the lower bands or both? Was Europe the main thrust? Or North America? Or Japan? Or everybody? Which month and what

phase (low, middle, high) of a solar cycle became important. This was my first exposure to long-term propagation planning.

Concurrent with doing these long-term predictions, my DXCC and WAZ totals climbed. Soon I made it to the Top of the Honor Roll (worked them all) for Mixed DXCC. And my 5BWAZ (5 Band Worked All Zones) totals are now only four zones (18, 22, 23, 26) away on 80-Meters to complete this goal. The desire to finish this is strong although I realize this may take several years. It reminds me of KD9SV's quest for 160-Meter WAZ. He had 39 zones for nine years, but finally worked JT1CO to finish it up. I certainly hope it doesn't take 9 years for me to QSO those last four zones – but who knows.

To help me with those last four zones, I've done more long-term propagation planning to prefixes in each of the four zones. For example, the recent March 14-27 DXpedition to S2 Bangladesh offered the opportunity to work zone 22. Since I needed it only on 80-Meters, the MUF (maximum useable frequency) really wasn't an issue – just absorption, which is minimal in the dark ionosphere. Thus I looked at sunrise and sunset times for both ends of the path in the middle of all twelve months. The result of this is the following table.

month	K9LA sunset	S2 sunrise	is K9LA sunset before S2 sunrise?	common darkness in minutes
Jan	2233	0045	yes	132
Feb	2310	0034	yes	84
Mar	2343	0010	yes	27
Apr	0016	2340	no	-----
May	0046	2321	no	-----
Jun	0107	2316	no	-----
Jul	0105	2325	no	-----
Aug	0034	2337	no	-----
Sep	2346	2348	yes	2
Oct	2256	2359	yes	63
Nov	2218	0016	yes	118
Dec	2210	0036	yes	146
				572 total minutes

month	S2 sunset	K9LA sunrise	is S2 sunset before K9LA sunrise?	common darkness in minutes
Jan	1129	1306	yes	97
Feb	1150	1239	yes	49
Mar	1203	1156	no	-----
Apr	1216	1105	no	-----
May	1229	1029	no	-----
Jun	1241	1015	no	-----
Jul	1243	1028	no	-----
Aug	1227	1055	no	-----
Sep	1158	1126	no	-----
Oct	1128	1157	yes	29
Nov	1109	1233	yes	84
Dec	1111	1302	yes	111
				370 total minutes

The data on the top is for my sunset. The data on the bottom is for my sunrise. The far right column in each data set is the duration in minutes of when the entire path is in darkness

(common darkness). The number at the bottom of each ‘common darkness in minutes’ column is the yearly duration of common darkness in minutes.

The path from K9LA to S2 offers opportunities at both my sunset and at my sunrise – depending on the month, of course. At my sunset, this opportunity occurs in seven of the twelve months. At my sunrise, this opportunity occurs in five of the twelve months. The yearly duration of common darkness confirms that my sunset offers the best overall opportunity. Of the twelve months, both data sets suggest that December and January are best solely based on common darkness duration. And solar minimum is likely to be more productive than solar maximum.

Knowing all these opportunities is fine, but of course I’m at the mercy of when a DXpedition goes to S2. The aforementioned S2 DXpedition in March is not available to me at my sunrise, but is on the edge for my sunset. Even if it is marginal, I had to try. I only heard them once on 80-Meter CW at my sunset – but no QSO. In the long run, I may have to make station improvements on 80-Meters to achieve my goal – a transmit antenna with gain, lower loss coax for the approximate 200-foot run to the antenna, a better receive antenna and running full legal power (my single-3CX800 amp is good for about 1000 Watts – which is down to about 800 Watts at the antenna after the existing 200-foot run).

This long-term propagation planning can also be done for MUF issues if one of the higher bands is the target. Unfortunately, we’re headed for solar minimum between Cycles 24 and 25, which means any long-term planning for the higher bands will look bleak. But don’t despair – short-term events in the ionosphere triggered by events on the Sun can make the higher bands interesting even at solar minimum. Especially watch for long path openings from North America to Europe or Asia on the higher bands as these paths go through the equatorial ionosphere where the ionization is the highest in the world.

To close out this month’s feature, I can’t help but think that this whole propagation planning process parallels life – with no goals, no planning is needed. Just let things happen and take what you get. But if you have goals, then planning is valuable.