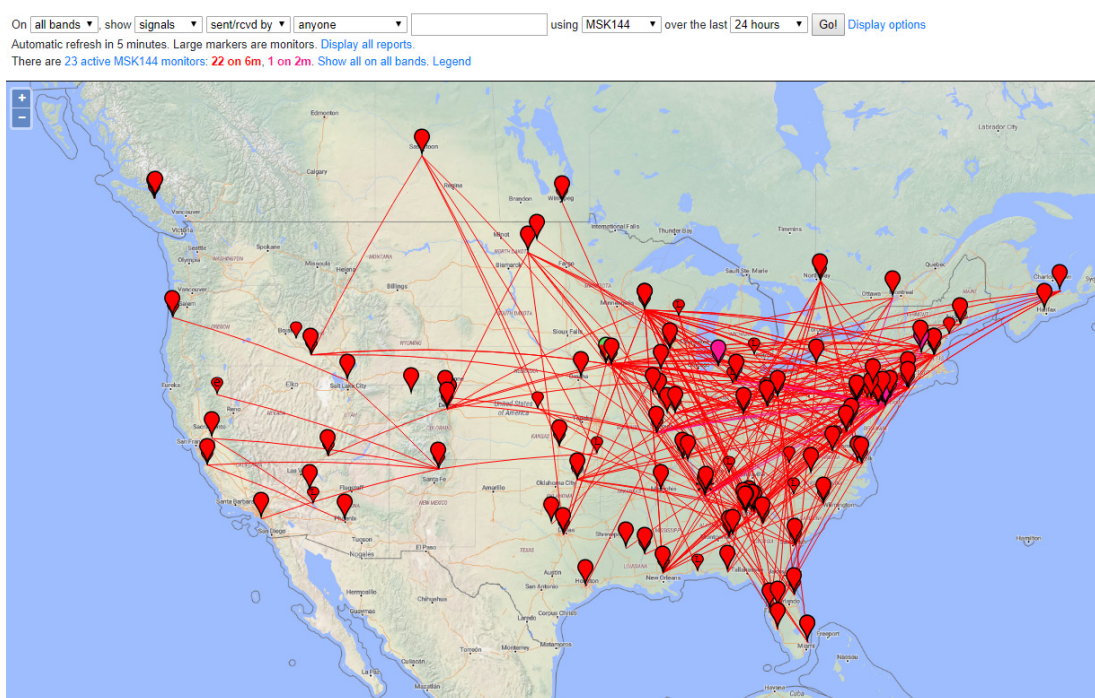


## MSK144, FT8, and Beyond

Joe Taylor, K1JT

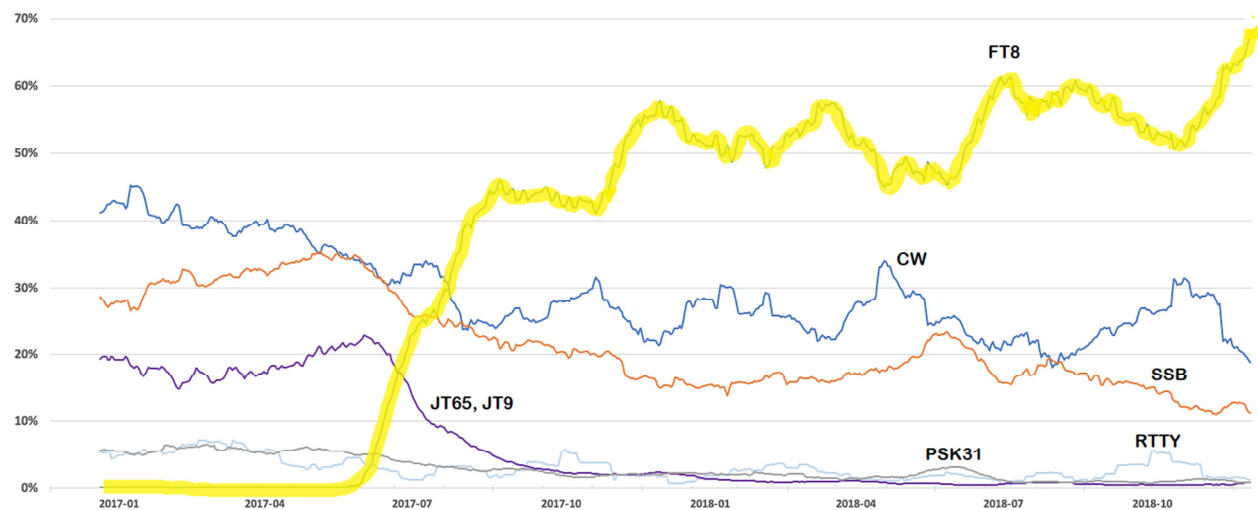
Three years ago, at the first VHF Super Conference, I spoke about new features and digital protocols being developed for the software package *WSJT-X*. My emphasis was on features of special interest to weak-signal enthusiasts on our VHF and higher bands. At that time we in the WSJT Development Group had been working on a new, much improved meteor scatter mode that was rapidly approaching its time for public release. We named the mode MSK144, and it started gaining popularity later in 2016. It's now in use worldwide, and has become the standard protocol for amateur meteor scatter contacts. The following screen shot, taken from the PSK Reporter web site on a weekday morning in mid-March, gives some indication of the current use of MSK144 on the 6 meter band, in this part of the world. Needless to say, activity levels are several times greater on weekends — sufficiently so that this map of North America becomes mostly hidden behind all the red dots and connecting lines.



At the 2016 Super Conference I also described some ideas we had been tossing around that might lead to a protocol well suited for propagation modes like multi-hop sporadic E and long-distance troposcatter. That experimental mode became known as FT8, and was publicly released in July 2017. It is serving its intended purposes very well; moreover, as you've probably heard, its explosive growth in popularity astonished everyone — including my co-designer Steve Franke, K9AN, and me. FT8 is now used effectively on all bands from MF to VHF, and higher. Since the last Super Conference

the number of active users of *WSJT-X* (and derivative programs such as *JTDX* and *MSHV*) has grown from around 4,000 to more than 20,000, in any given week.

An even better indication of the worldwide use of FT8 can be gained from the following graph adapted from an analysis done by Michael Wells, G7VJR, the author of Club Log (an online log hosting tool somewhat like LoTW, but designed for other purposes). Based on station logs posted by some 22,000 users and containing nearly 80 million QSOs, the graph shows the percentage of QSOs made in six different mode categories throughout calendar years 2017 and 2018. By this measure, at least, nearly 70% of all amateur QSOs are currently being made with FT8.



The digi-modes in *WSJT* and *WSJT-X* were designed, at least in part, with possible uses in VHF contests kept in mind. The MSK144 and FT8 protocols include features that make them especially convenient to use in North American VHF contests. Many top contesters have taken advantage of these capabilities in recent years, and such activity increased markedly in the 2019 January VHF contest. However, many have noticed that rapid-fire sequences of FT8 contacts do not fit easily into operating procedures where one moves a QSO partner through many bands. The VHF weak-signal community should benefit from broad discussion of such issues, perhaps generating new ideas about what might lead to even more enjoyable contesting experiences.

As a teaser, I should mention here some ongoing work on yet another new Frank-Taylor mode that may soon see light of day in *WSJT-X*. The mode will probably be called FT4; its main aim is to be at least as fast as RTTY for radio contesting, with QSO rates up to several hundred per hour, while otherwise sharing many desirable characteristics of FT8. At the Super Conference, six weeks away as I write, I hope we'll be ready for me to describe this new mode in detail.

Author's note: Joe Taylor was first licensed as KN2ITP in 1954, and has since held call signs K2ITP, WA1LXQ, W1HFV, VK2BJX, and K1JT. He was Professor of Astronomy at the University of Massachusetts from 1969 to 1981, and since then Professor of Physics at Princeton University, serving there also as Dean of the Faculty for 6 years. He was awarded the Nobel Prize in Physics in 1993 for discovery of the first orbiting pulsar, leading to observations that established the existence of gravitational waves. After retirement, he has been busy developing and enhancing digital protocols for weak-signal communication by Amateur Radio, including JT65, WSPR, MSK144, and FT8. He chases DX from 160 meters through the microwave bands. You can reach Joe at [joe@princeton.edu](mailto:joe@princeton.edu)