

VHF Distance Scoring Working Group

Report of Proceedings

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- Second version Dec. 2009 added simulations and revisions to baseline rules
- Third version added comments regarding activities in 2010; moved Executive Summary to Appendix V; revised baseline rules

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Development and Deliberations of Working Group

Many comments have been made over the years regarding distance scoring in US VHF contests. A lively discussion on the subject occurred on the VHF Contesting Reflector in January, 2009. Kevin Kaufhold, W9GKA, suggested exploring the issue in more depth, and on Feb. 15, 2009, a Yahoo User's Group was established at: <http://groups.yahoo.com/group/VHFDistanceScoring/>.

Close to 40 people quickly joined the user's group. Working group members come from all over the country as well as Canada. Many have rover experience, but large multi-ops, SO's and QRP stations are also well-represented. Most members have strong backgrounds in contesting, and some have been contesting on VHF for over 20 years.

At least twelve members have identified themselves as being in favor of distance scoring methods. Fifteen members did not state a position at the outset, while four considered themselves neutral on the topic. At least two people were openly concerned about the distance scoring concept, while several other members appeared to be monitoring the activities of the group to gauge any perceived negative impact upon current VHF contesting rules. Four members had prior experience with UK and EU VHF events in which distance scoring was used.

Given the initial feelings of working group members, the moderator of the group made efforts to have members seriously consider and evaluate all view points, and to seek consensus on the issues where possible.

The group discussed numerous issues surrounding distance-based efforts. This document comprises the "minutes" of the group's discussions. Extensive analysis of the issues, polling of the members, simulations, baseline distance scoring rules, and possible implementation schedules are all included in this report. Beyond this document, the working group maintains numerous examples of distance scoring rules around the world, many other files, a historical review of distance-based efforts, numerous statistical simulation of live contest data, and a complete historical record of all group messages. Non-members can view all group messages, and anyone can gain access to all files by becoming a user group member.

Ultimately, proposed baseline rules and calculation standards were developed. A preliminary, working draft of the group's activities was prepared in May, 2009. Many group members then attended the 2009 CS VHF Conference in Chicago. Informal discussions occurred there regarding the distance scoring concept. John, K9JK, indicated that he was interested in using some form of distance scoring in the 2010 Spring Sprints. Group members were enthusiastic about this possibility. Additional simulations were conducted throughout the year. The 1st version of this Report was

finished and circulated in September, 2009. A 2nd version in Dec, 2009 included simulations conducted in the fall of 2009.

The 2010 Spring Sprints did indeed move to distance scoring. No major problems occurred with the usage of 6 digit exchanges, and no dramatic changes in logs counts or station activity from earlier years were noted. Simulation 7 examined the Sprints in great detail. The 3rd version of this Report was issued in December, 2010, which includes updates for activities in 2010.

Description of Distance Scoring Methods

There are several primary methods of distance based scoring. These methods are briefly summarized below. Greater details on the contests are found in the working group's files.

Points Per Km. A pure distance based contest typically will have one point assigned for each km of distance between the two ends of the QSO. A minimum distance can also be mandated, such as 1 km (this is in our own 10G rules, for example). A variant of the points per km is to award points for a certain range or zone of distance (Stew Perry 160). This was quite common in the early days of contesting (pre-1948 rules). New Zealand (NZART) and Australia (Ross Hull) uses various forms of zones, but most of Europe uses points per km without any zones.

A bonus is sometimes added of 100 QSO points for each unique call sign worked per band (10G and SMBS 2G). San Bernardino also counts 1000 points bonus for each band that at least one contact is made on. Other contests will provide for QSO and / or band multipliers on the higher bands

To avoid the lower VHF bands from overwhelming the shorter distances attained on the higher bands, sometimes each band is normalized, with a maximum being given on each band to the leader's score (RSGB). Normalization could also occur on the basis of the farthest distance QSO, and everyone else is then scaled down from there (This is evidently done with our 10G, although we could use more specifics on this). With either form of normalization, activity on each band can then be included without any one band swamping another. Other times, there is no normalization. Separate competitions for individual bands are also quite common in EU and VK. This avoids the need to normalize across the bands. Successive events also exist, where a three hour contest on 2 meters is immediately followed by a 2 hour contest on 432 (DL VHF-UHF contests). This also avoids the need for normalization as well as its complexities.

Adjacent Squares. Using adjacent grids or concentric rings as a measurement of distance was proposed beginning in 1999. These proposals are also known as "bulls eyes" for obvious reasons. Essentially, each successive grid ring is counted as an additional point, with some maximum point normally established. Grids therefore still

form the basis of the distance system, only with grids farther away from the QTH counting for more points. A concentric approach has not been adopted in any known event.

Combination Events. A few events use the points per km method, and then given a bonus of 500 points per 4 digit grid locator (Latvia; Denmark). The 1982 August UHF in the US multiplied QSO points * distance multiplier * grid multiplier. Currently, most other EU, VK, and ZL contests use a pure distance method without bonus given for grids worked. Some EU contests also provide bonuses for DXCC entities worked and / or national regions or sections worked.

Advantages / Disadvantages of Distance Scoring

In a preliminary exercise of the working group designed to elicit basic strengths or weaknesses of distance based methods, the following items were provided by group members.

Overall, proponents clearly understood the strengths of long-standing contests based on grid squares. Many advocates of distance scoring largely desired to enhance US VHF contests by adding variety and quality of operation to various events. Those hesitant about distance methods acknowledged the possibility that a different scoring method might ultimately prove to be very useful, so long as the existing contesting structure is not adversely affected in the process. Thus, this initial exercise might serve to forge common ground among all sides concerned.

Advantages

- Bring variety to contest scoring methods (this is the most often cited reason by proponents);
 - o As a result, could increase participation from individuals desiring diversity of contest style
- Conversely, current contests could be decreasing participation by not having variety;
 - o rules need to methodically change to maintain interest;
 - o seasoned ops are currently burned out on the sameness of existing events;
 - o frustration exists with some of the existing rules
- Current system is generally thought to be viable,
 - o but suffers from too much “sameness”;

- and is seen as too resistant to change and new ideas.
- Distance concept is consistent with the diversity of the specialty contests of 10G, UHF, EME, VHF Sprints, etc
- Flexible in implementation; could be developed via a parallel track with an existing contest or as a separate event
- Emphasizes operator skill and technical abilities by reaching for longer distances rather than sheer quantity of QSO's, many of which are within close distance.
 - Current contests put too much emphasis on simple QSO's;
 - VHF contesting can be quite glamorous and exciting if long distance QSO's are emphasized, instead.
 - Harkens back to the "golden age" of VHF operations when long distance QSO's were regularly sought, and distance records boxes were a regular feature of the World Above column.
 - Distance scoring would encourage the technical improvement of both fixed and rover stations
 - Would provide incentive to activate very rare areas; and to work into low population areas
 - Although one member felt that high population areas would still be emphasized, simply due to the high amount of signals
 - Would eliminate the N-S alignment that exists now with a 1 x 2 grid system
 - Would encourage more MS activity in contests, and maybe even EME.
- Distance scoring may decrease potential for captive rovers; Concept may provide a partial solution to continuing grid controversy, since grids intersections are no longer critical for either QSO's or multipliers; some group members see this as a "bonus" on top of other reasons in favor of distance concepts.
 - Other proponents of the concept feel that distance scoring is strong enough to stand on its own merits; and that there are more direct ways to deal with rover rules problems than by implementing a totally new scoring method.
- Proponents generally do not seek to level the playing field, but desire more variety and emphasis on operating ability at achieving longer distances.
- Could develop new and interesting contesting strategies, with portables and rovers possibly developing long-range capabilities
- Current contests are multiplicative, with geometric increases in points as grids are worked;

- Distance methods could be additive in nature, linearly increasing scores as contacts are made.
 - This also would avoid or minimize contest strategies based on short range QSO's made in nearby grids
- A new distance scoring contest could also be supplemented with new awards, like a top ten box for distance, or million km award for working specified distances accumulated over many contests.
- Proponents generally acknowledge there is a valid place for the traditional line up of contests.
 - Some even state that distance methods should not displace current events until they become proven winners
 - Replacing the traditional contests is probably a bad idea
 - Do not want to inadvertently introduce new problems or unintended consequences into contests that are generally working
 - Distance contests may even increase participation if not directly linked to current contests, supplementing traditional events rather than replacing them.

Disadvantages

- Grids squares have generally worked well for over 25 years, much better than ARRL sections; so why change to something that has been used in the US in a long time?
- Grids already are a form of distance scoring, with farther distances being necessary to work additional multipliers
- Distance efforts are likely to benefit the bigger, well equipped stations more than smaller stations
- Distance proposals have been around for many years, never generating huge amounts of support
- Historical evidence is mixed to negative on the development of distance scoring in US contests
- Latest effort at distance efforts (i.e. this working group) appears to be partially motivated by a search for alternatives to grid problems with rovers;
 - These problems should be dealt with more directly in the current rules rather than moving to a totally different system.

- Distance efforts will also be difficult to implement on 6 and even 2 meters, and may even be counter-productive on these bands, since no one will have any incentive to reach beyond maximum limits imposed.
- Using concentric rings as a substitute for point per km also suffers from different sizes of grids at different latitudes and would overly emphasize a N-S alignment of rovers and fixed stations.
- Any distance system will be more complex than grids to develop
- And will likely be more difficult to administer
- There is a good chance that distance efforts would be confusing to many, actually reducing participation
- No clear showing that distance efforts will increase contest activity or participation
- Distance methods could cause significant changes or disruption to the class structure of existing contests.
- Concern has been expressed that distance events would inevitably favor high population density areas.
- General recognition by those concerned about the concept that distance scoring could be very useful in the right setting
 - o No strenuous objections if developed as an event that does not adversely impact existing contest structures

Impact to Contest Structure

As another exercise in becoming familiar with the finer points of distance methods, the working group discussed possible impacts to VHF contesting from various types of distance scoring.

EU styled, points per km method

Using points per km or points per km range would produce scores based on distance worked for each QSO, rather than the number of grids worked.

Most group members felt that this method could cause a significant change in contesting, and a likely impact upon rovers, in particular. Members generally acknowledged that distance events could generate an upheaval in a currently existing

contest, if not phased in over time. Many of the responses felt this was a reason to either create a new contest or modify a minor event.

There would likely be more of a motivation for all classes to work long distances, instead of merely concentrating on nearby, high population areas. Rovers may be impacted the most, since there would be no reason to activate nearby grids. Portable operations could quite possibly increase however, resulting from a desire to seek higher ground to operate from. Some group members felt that rovers would travel less, but then operate more in a few well-chosen locations, with rovers becoming more of a portable type of activity that could move between locations. Both fixed and mobile stations that are designed for short-haul QSO's will not be overly useful.

As to the role that rovers should continue playing in a distance-based contest, at least two members were in favor of an EU styled rule that prohibited moves among participants. These responses were oriented towards a desire for long distance objectives in contests rather than an emphasis on various contest tactics, as is currently the case. Most other members felt however that rovers served a critical role in US contests. Many responses believed that several areas of the country would have very slow activity rates without rovers. One response felt that a no rover event would make a distance contest into an "all-east coast final". But there was a lack of agreement on how to keep rovers involved. Some felt that re-contact should be allowed after a certain distance, while others felt that re-contact should occur whenever a move occurred to a new 4 digit grid.

While significant changes would likely occur in a distance contest, if done correctly, such a contest would shift activity from a "quantity" of contacts to a "quality" of contacts. There was a genuine desire to see the return of mountain top portables, and distance scoring might assist in this regard. Grid circling might continue to some extent, as well. There was even some concern that a pair of rovers could "spiral" around each other in a distance contest, maintaining sufficient distances to still win with a pack or team style or operation. Other comments suggested however that without the possibility of grid multipliers, grid circling may no longer exist. For instance, numerous 2 km QSO's would be worth far less than a single 100 km contact. Several responses believed that rovers would tend to move to higher ground, not have as many nearby QSO's, but then increase the distance of their contacts.

There was also a feeling that distance based events could return VHF contesting back to the days in which people were greatly interested in working long distances, and were not overly concerned with working a number of nearby contacts. All responses were very enthusiastic about this possibility, in fact. A return of distance box records, and the development of a contest cumulative distance award of say 1,000,000 km worked over all contests, were seen as some of the possibilities with distance events.

A few people believed that the gap between the well-equipped station and the more modest ones would increase with distance events. Several responses felt that winners

will continue to be winners. Very few responses indicated that the motivation for distance events was due to a desire to “level the playing field”.

Continued Use of Grids

Concentric Rings. A concentric ring system would increase the value of distant contacts by more heavily weighting grids farther from the station. Contestants relying on nearby QSO's would be hurt by this, while contestants used long distance contacts would benefit.

Concern exists among some group members that a grid ring system would distort distance measurements, because grids are 1 x 2 degrees. This provides an incentive to work in an N-S alignment. Further, the grids physically change size as we move to higher latitudes, so that would further change "distance" as measured by grids. The gradation of successive grids might be sufficient for the lower VHF bands, but would not be overly useful for the upper microwave bands. One member even felt that had a concentric ring approach been adopted in 1999 when it was initially proposed, that these problems may have eventually forced a reevaluation of the method.

There is also some concern that much of the original motivation for a concentric ring system was to effectively penalize captive rover situations, although some group members currently view an adjacent ring concept as providing a better opportunity to work longer distances by all contestants. The primary motivation for the implementation of a distance-based system can and should be the encouragement of longer distance QSO's. Grid circling in one member's view is an extreme example of what happens when VHF contests systematically under-emphasizes long distance QSO's.

Overall however, a distance contest based on grids is seen as being less disruptive to the current VHF contests that rely upon grid squares. A grid based distance scoring system might be useful as a parallel event held in conjunction with an existing VHF contest.

Combination Events. Both grids and distance measures have been combined in various ways. Group members felt that any event should be kept as simple as possible, and there was a general concern expressed that combination events could become more complex than pure distance methods. There was also fear that combination contests would preserve many of the shortcomings of the current grid scoring system today. There might be some advantage to having distance act as a bonus on top of a currently developed grid-based contest, however. Even the 1982 UHF contest that provided for multipliers of both distance and grids might have some merit. Anything that would provide an incentive to work longer distances should be explored, including combination events. One member suggested that simulations explore the various types of distance methods under discussion.

As the group moved onto other subjects, it became apparent that some members favored the retention of grids in some form, either as the indicator for re-contact; as a bonus of some kind, or even as continued usage of grid multipliers with distance in km * grids. Combination scoring methods were tested in Simulation 4.

Review of Historical Evidence

Reviewing past distance based efforts sheds light on the question of impact to contest structure. Early ultra-high contests from 1936 through 1947 normally used distance methods. These efforts were then replaced by states and ARRL sections beginning in 1948. Ed Tilton thought that technological advances made the UHF Marathons and UHF Relays obsolete because the calculations of distance based QSO's were becoming astronomical. Tilton's comments are also included in the file folders.

Then when grids replaced sections in 1983, the grid square program was considered to be something of a distance measure, only without the need for cumbersome mileage calculations. Around the same time, the 1982 August UHF contest actually used distance measures, but this experiment lasted only one year when we moved to grids.

The 1987 Spring Sprints had a very negative reaction to distance scoring. In fact, that experiment occurred only one year on one band, never having been attempted before or since in the Sprints. So here are a few questions:

The 2004 VHF – UHF committee proposed the adoption of a concentric ring approach (relevant parts of the MSG report are in our file folders). The entire MSG package, including the distance scoring proposal, was shot down in a blistering hailstorm of criticism.

The 10G contest has been around for many years, and contestants are quite used to the distance scoring calculations used in that contest. The San Bernardino Microwave Society uses distance scoring in their 2 GHz contest without any complaints.

Over the last decade there have been regular statements made in support of distance concepts, including many notes from individuals in this working group. These proposals have never gained a critical mass of support in the VHF community.

The international historical evidence is more positive. Europe has a very long and successful history of using distance methods in their contests. Distance methods appear to be the predominant scoring technique, in fact, for all contests 6 meters and above.

Australia also uses distance measures. The wide open spaces of that country are even closer to our situation than the high population density and relatively small land mass of Europe. But the evidence is not completely in favor of distance concepts, even in

VK. The Ross Hull contest has now moved back to grids squares after being based on distance methods. One of the reasons cited for the declining contest participation in that contest was the complexity of distance scoring

Analysis of Past Distance Events. History serves as a capable guide in identifying mistakes to avoid as well as items to emphasize.

Distance measures were the standard way to score events in the pre-1948 period. The move away from distance methods may have reflected the desire to align VHF contesting with successes then being enjoyed on HF, particularly in the Sweepstakes. A move to ARRL sections and states on VHF unified all forms of contesting. The escalation of possible distances being achieved on the lower bands also foreshadowed a move away from distance calculations. Numerous methods at countering that problem, including normalization, QSO and band weighting, and distance zones, have since been used with success, however.

More troubling are the failed attempts at implementing distance methods since the early years of contesting. The one-year experiment with distance in the 1982 August UHF can be explained in large part by the move towards grids squares that was by then underway. A 1 x 1 grid had been used in the UHF as early as 1978. The international adoption of the 1 x 2 grid square and the pending development of the VUCC program overshadowed the 1982 effort. Additionally, the RANGE calculation in the 1982 UHF was overly convoluted, and has never been attempted again in any known distance contest.

The failure of the 1987 1296 MHz Spring Sprints, in hindsight, was rather predictable. Considering that grids squares were by then enjoying huge popularity, the distance calculations that were required in a pre-PC computer era just added to the negative reaction by contestants. Much more promising has been successes in other microwave events using distance calculations, including the 10G and the SBMS 2 GHz. Computers have greatly simplified the calculation process, and microwave contestants easily accept 6-digit exchange information.

The dismal rejection of the 2004 VUF-UHF sub-committee recommendations aptly demonstrates what happens when the contesting community is confronted with major changes that are perceived to be overly radical.

The lack of popular acceptance in the US for distance efforts at the current time may be from the perception that the distance concept are on the “fringe” of numerous ideas floating around the VHF community. Possibly because of the numerous types of distance calculations available, proponents of distance ideas have not developed internal focus or cohesion of views. Hopefully, this working group is generating the necessary focus that allows a proper analysis to be made.

Also very promising is the wide-spread success of distance methods overseas. Distance measures comprise the standard way to tabulate scores in EU and VK, in

fact. One could argue that the higher population densities and mountainous terrain of Europe are ideally suited for distance methods while the wider spaces of the US are not overly amenable to distance calculations. Success with distance contests in Australia, however, demonstrates that such contests can be utilized in low population areas having relatively large land masses.

The move back to grids in the 2009 Ross Hull may represent more of an alignment of methods currently used in the Australian VHF Field Day. The reference in the 2009 Ross Hull commentary section to distance methods being overly complicated does bolster the need however, of devising a system that will be simple to implement. Overall, international experience with distance-based contests provides many examples that potentially could prove to be workable in the US.

The 2010 Spring Sprints experienced no major difficulties in its initial year of distance scoring. Contestants quickly adopted the use of six character exchanges, and participation levels were up slightly from 2009. Commercial logging programs were not set up for the new rules, but the contest sponsor was able to generate distance results on all logs so long as a Cabrillo format was used. Overall, the Sprints may be showing that single band distance contests are viable in the US. This conclusion contains a caveat however: there was no e-skip during the 6 Meter Sprint; no moon window existed on most of the Sprints; and the evening hours of most Sprints made meteor scatter QSO's impractical.

Specific Issues

Several important items exist that will give shape to more particular proposals. The following matters have been discussed by the working group.

General Items

The concern is often expressed that distance events would be severely skewed by the very long distances that are possible on 6 meters and even 2 meters. The various options developed over the years to deal with this concern are discussed below, along with response by the group members.

On UHF-Like contests. There was an acknowledgement that a 222 and above contest would remove the tendency for 6 meters (especially) from overwhelming distance scoring. Many members did not like the idea of creating a UHF type of event however. The lower bands are great starting places for VHF, and the fear was that participation would fall off if 6 and 2 were not included. Also, 2 meters is the workhorse band on VHF. Removing that band could really reduce participation, limiting activity to only "core" group of VHF enthusiasts with higher band capabilities. Additionally, removing 6 and 2 could just shift the discussion up the

bands, with discussions then occurring over 222 and 432 being the bands that overwhelmed scoring.

There was also a general belief that the real problem with very long distances is from the great variability of Es on 6. There was therefore some support for a 2 meter and above event. However, the unique nature of 6 meters was viewed as being a positive thing, with greater variety in VHF contests then being possible. Another member noted that 6 meters skews results now, so why should be concerned about the lower bands overwhelming distance calculations when 6 meters already dominates contests whenever Es occurs?

As the discussion progressed, some support developed for ultimately recommending an August UHF like event as a “natural” contest for distance methods as well having one or more major contest made into a distance event. Simulations 4 and 5 tested distance rules in August UHF-like conditions, with promising results.

“Pure” Points per km. Large support existed for this method, so much so that this points per km may be the “default” preference emerging among group members. The question then becomes how do we provide for lower band QSO’s without making higher band activity completely pointless? Several simulations statistically tested various concepts on this.

Limits on distance points. To prevent very long QSO’s on 6 and 2 from overwhelming QSO’s on all bands, one member felt the maximum distance points awarded should be 600 miles. Another felt that 1,500 miles would be appropriate, in light of the MS maximum range being in that range on the lower VHF bands. Another responses was that 3,000 km (1800 miles) might generate too much variation of distance points, from 0 to 3,000. Still another suggestion was to have some kind of limit for 6 and then a slightly higher limit on 2. There was a growing belief among the working group that some type of cap might be necessary. Some members simply did not like caps however, believing that distance limits would only discourage long distance QSO’s.

On Normalization. Some members felt normalization would be useful, but most thought that it would be complex to administer and would not produce scoring comparables across the years. Even the members who believed that normalization was a workable method to use acknowledged that the method might not be well-liked by the general contest population.

Points per km Zone. Some members felt this option was viable, especially if a pure system could not be adequately developed. Some members were concerned with the artificial demarcation of points across varying zones however, especially on the microwaves bands. The coarseness of zones might work well for 6 meters, but would become more problematic on the higher bands.

QSO and Band multipliers. Some thought this was workable, especially if a pure points per km method would be used. Some kind of multiplier for the higher bands would be necessary to prevent longer distances on the lower bands from overwhelming QSO's on all other bands. Multipliers need not be in whole numbers, either. This may provide proper incentives for using microwaves without giving too much emphasis to the upper bands.

There was some reluctance expressed however as to the basic idea of multipliers. The concern was that we may just be returning to the debate over microwave scoring methodology. Using bonuses rather than multipliers was proposed as a way to deal with the issue. Others were just not sure about the effect that multipliers would have on a contest structure.

Off Peak Times. There was some support for developing a distance event outside of the peak Es season. The relative dormancy of 6 meters outside of the Es season would reduce the likelihood of distortion from long distance QSO's occurring on only one band.

Single band contests. There was also support for developing a simultaneous single band event. This would avoid an entire series of issues regarding what bands to include, QSO weighting, and band multipliers. Generally, the VHF+ bands cover such a wide range of propagation types that a truly uniform scoring system would be very difficult to implement. One member even suggested to just convert the present-day VHF Sprints into separate distance contests, with there being no need to then having a simultaneous event.

With the adoption of distance in the 2010 Spring Sprints, it would seem that single band distance events are underway in the US. With the Sprints having a cumulative award for the summation of all single band contests, there is even something of a multi-band concept developing in the Sprints.

Concentric Rings. This method was viewed as possibly being useful for existing events. Even then, many members believed that this method would not really work that well for the higher bands. One member stated: "Overall, I can't get too excited about this approach". Another member noted: "I simply don't like the ring idea. I would rather stay with a pure pts / km scoring scheme".

Average distance per band. A member (N9DG) came up with an interesting idea that may have never been thought of before, despite the great variety of options deployed over the years. To avoid individual QSO's from skewing results, scoring would be by: Average distance on each band * QSO's on each band. This provides motivation to make long haul QSO's as well as a vast number of QSO's.

Developing distance in different contests. One member felt that distance methods should replace grid squares in the UHF contest, while we should have a distance contest within a contest for just 6 and 2 in the 3 ARRL major contests. In this way,

problems with 6 and 2 would be eliminated through the development of distance measures for separate bands in different events.

On EME and MS

The possibility that EME and even MS contacts could both dwarf distances achieved by terrestrial contacts have led to some distance events around the world to either ban certain types of contacts, or to severely curtail such contacts.

On EME, working group members were split, with some wanting a prohibition while others wanted to encourage such contacts. One member proposed a cap on EME (without specifying a proposed amount). Another station thought that some form of a sliding scale would be appropriate.

On meteor scatter, there was more support for treating MS contacts similar to contacts through any other form of propagation. Some members generally proposed a cap to prevent skewing. Other members were uncomfortable with caps, believing that the very long distances would then effectively be penalized through a cap.

One member noted that a distance zone concept would avoid the problem with caps and skewing by very long distance QSO's, since the maximum zone would by default incorporate EME, MS, Es, Au and any other QSO's involving very long distances.

In an effort to develop cohesion on the issue of skewing from very long haul QSO's, the moderator of the group, W9GKA, proposed a sliding scale of maximum distance awarded for each band. This would limit the distortion that was possible from round-the-world QSO's on 6 as well as from EME. The reaction to the proposal was mixed. Some members still wanted to ban EME altogether. Another person felt that a flat-out prohibition was not a credible way to deal with the issue. Others strongly advocated the usage of EME. Another member believed that EME would not cause much of a difficulty in any event, due to low amounts of EME activity in most VHF contests.

Several members then reiterated their previous statements – that a wide-open 6 meter band will destroy any ability at effectively deploying distance measures on other bands; that a concurrent single band event would work; and that a zone concept was also useful; that a 7 to 10 grid concentric ring method would also avoid the problem, by including EME and very long haul terrestrial QSO's in the farthest ring. There was even support and opposition again expressed on QSO points and band multipliers.

The moderator then suggested an alternate rule to give EME contacts the maximum amount of distance points achieved by any other means on each band in the contest, perhaps with a small bonus. The alternate would keep EME in the mix, but would not address possible distortion from round-the-world 6 meter QSO's. The alternate drew little response, as the discussion was by then wearing down among group members. However, one response suggested to just calculate the earth distance between the two

EME stations. This proposal by itself would likely generate skewing, since all bands with EME would now have round-the-world QSO's occurring on them. A clause was placed into the miscellaneous section of the proposed rules to calculate EME distances as earth distances, not the distance to the moon and back. This clarifies the calculation of EME distances, but the issue of limits or caps on distance remains unresolved.

Also see the discussion on categories for a proposal that would put EME and digital MS into a separate unlimited category.

One EME station suggested a sliding scale to avoid very long QSO's swamping out all other contacts (count 1 point per km for the first 2,000 km; then count 10% of km distance over 2000 km).

See Simulation 1 and 4 for further discussions on the effects of EME and other long QSO's, and possible avenues to explore. In particular, Simulation 4 showed that the basic decision to move to distance scoring affected results by far more than any restriction or limitation on long distance QSO's. In fact, limits or caps only had marginal effects on 6 meter contributions to total distance scores, whereas a move to 1 point per km had an overwhelming effect on 6 meter percentages in a contest with good amounts of 6 meter Es. This analysis suggests that distance scoring may be best suited for events outside of the normal Es season. Then, a sliding scale approach could be implemented to reduce the impact of very-long QSO's without overly restricting such QSO's.

Distance Required for Re-contact

Most responses supported re-contact. The "x" distance before re-contact was discussed without much agreement. Too small of a distance, and we would be encouraging "quantity" of close-in QSO's. Too long a distance for re-contact, and the rovers / portables end up driving more than making QSO's. Group members proposed 50 km (around 30 miles); 80 km (50 miles); and 100 km (around 60 miles).

Two members who were rovers proposed to allow re-contact whenever the moving station went to another 4 digit grid. This suggestion was met with resistance from members who felt that in distance events, grids had no useful purpose. There was also concern that grid circling would still occur around the grid corners. In response, one person suggested to allow re-contact when a move of more than 25 miles occurred to another 4-digit grid. This would at least prevent activity at a grid corner. Objections continued however, with the belief that any use of grids (aside from the exchange info, itself) would be a throwback to a coordinate system that had no real use in a distance based contest other than to perpetuate artificially derived contacts.

A member also suggested to allow multiple re-contacts in the same grid, but then only count the farthest QSO's for points. This would increase the "chatter" and overall

activity of the bands, as well as encouraging distance contacts. Another response favored rovers and portables submitting separate logs every time, as was done many years ago in the ARRL VHF contests.

Some members favored the European rule, with no re-contact allowed. One person felt that re-contact had a place in microwave events, but not in VHF / UHF events, other than as QSO's from a new location. Another person wanted to delay re-contact until the basic operation and rules of a prototype has been developed further. Still another response believed that the basic motivation for rovers to exist would not be present in a distance event, since there would be no grid multipliers. Thus, even with re-contact allowed, rovers may become more like present-day portable operations, moving around less and seeking out higher ground.

For existing events, there was more agreement that re-contact would have to be allowed whenever there was a move to a new 4-digit grid square. This is due to the ability of rovers under the current rules to re-contact stations around grid corners. It would be difficult to allow re-contact only after "x" distance when current rules effectively allows re-contact every few feet around a grid corner.

QSO Points and Band Multipliers

Most members felt that there was a place for point differentials between the various bands. Many also wanted to develop special incentives for 222 and 902. While there was a concern that too great a weighting may tilt too much towards the microwaves, the common belief was that distance scoring may lessen the problem, due to the lack of close-in QSO's being now able to dominate the scoring.

Another thoughtful comment contained comparisons to other weighting methods. Fairness as a system is difficult at best, and is also subject to subjective evaluation, so we should primarily aim to encourage activity on all bands. Normalization suffered from lack of comparables; The Sprints may be a great place to try out distance scoring, possibly with a bonus for unique call signs (a 100 point bonus similar to the 10G and SBMS was mentioned by several people); Extra weighting for bands above 10G may be appropriate, at least 2:1 ratios. Simulations would be very good for the band weighting issue, in general.

Another member supported single band events as an alternative to band weighting. Another comment suggested eliminating 6 meters from distance events, due to the dramatically different propagation characteristics of that band from all other VHF bands. This belief was shared by another response that suggested implementing distance scoring in the August UHF contest, and then giving all the bands the same weight. Another comment favored no band weighting at all, even with 6 meters included. Most responses favored some type of weighting, however. There was also continuing support and opposition to an EME prohibition. One person proposed allowing multiple contacts between 2 stations using various modes. This would be

similar to the sub-bands of Field Day for CW, SSB, and RTTY. Reaction to this idea was mixed.

Several QSO point schedules were suggested and reviewed. They varied from the January VHF Sweepstakes with a 1:8 ratio; August UHF, 3:12 ratio; N9DG and K9ZF, 1:7; 2 W2EV, 2:15 ratio. For those group members favoring QSO points, there was strong support for an incremental schedule that would take the lumpiness of out QSO point weighting in the current VHF contests. Based on these suggestions, the moderator proposed a schedule of 1:10. This proposal is incorporated in Appendix II, along with several alternate proposals.

Following the dissemination of the proposed schedule, concern was again expressed that any weighting close to the current schedule in the ARRL VHF contests would effectively continue incentives for captive rovers and grid circling to exist. Others felt that if an “x” distance were used for re-contact, that such incentives would be greatly reduced.

Discussion on Zones

There were a variety of comments made as to zones. Some people thought that zones would solve problems and issues encountered with the pure distance methods concerning maximum distance and QSO point formulas. Others contended that zones were too complicated, with arbitrary decisions having to be made regarding size and width of the zones. There was also concern regarding the use of zones on the microwave bands, with not enough “granularity” provided to the zones format.

Several zone formats were suggested. One member suggested the following:

6, 2, 222 – 1 point per 100 km;
432, 902, 1.2 – 1 point per 25 km;
2.3 – 10G – 1 point per 10 km;
> 10G – 1 point per 5 km.

Max of 1000 km; no grid or band multipliers. Possibly, points * unique call signs worked on each band. There was some objection to unique call signs however, with the belief that call signs had nothing to do with distance, and that close-by QSO's would be encouraged.

Another member wanted a combination type of event, with distance zones * grids-4.

0-99 km (1 point);
100-199 (2 points);
200-299 (3 points);
300-399 (4 points);
400-499 (5 points);
500-599 (6 points);
> 600 (7 points).

We would continue with band multipliers, as well. Another person did not want grids however, saying that a distance contest should be measured by distance alone.

The moderator noted to the group the zone schedule of the ZLART VHF contest:

| km) | 6 m | 2 m | 70 cm |
|-----------|-----|-----|-------|
| 0-25 | 1 | 1 | 2 |
| 25-50 | 2 | 2 | 3 |
| 50-75 | 3 | 3 | 5 |
| 75-100 | 5 | 5 | 7 |
| 100-150 | 7 | 7 | 10 |
| 150-200 | 10 | 10 | 15 |
| 200-300 | 12 | 12 | 20 |
| 300-400 | 15 | 15 | 30 |
| 400-500 | 20 | 20 | 40 |
| 500-600 | 25 | 25 | 50 |
| 600-800 | 25 | 40 | 75 |
| 800-1200 | 25 | 50 | 100 |
| 1200-2000 | 35 | 75 | 150 |
| 2000-3000 | 50 | 125 | 250 |
| 3000-4000 | 60 | 175 | 350 |
| 4000-5000 | 80 | 225 | 450 |
| >5000 | 100 | 250 | 500 |

48 cm 0.3 points per kilometre
32 cm 0.3 points per kilometre
23 cm 0.2 points per kilometre
13 cm 0.5 points per kilometre
Above 3 GHz, one point per kilometre

The moderator did not necessarily recommend the ZL zone structure, only offered it as a very well thought out schedule. The above schedule is clever in several respects, however. Zones are actually used only on the lower three bands. This eliminates the problem of there not being enough granularity to the zones on the microwaves. Also note that QSO points / band multipliers are effectively built into the schedule, with more points awarded for the same km zones on 2 and 432. The schedule appears to be non-linear, exponentially increasing on 2 and 432, with almost no extra weighting in the closer zones, but then expanding to 1:2.5 and 1:5 ratios on 2 and 70 cm by the last zone.

Additional Items

Exchange Info. This topic evolved as new information became available and as members provided comments to each other. In general, there is widespread agreement to use the 6-digit grid locator.

Initially, lat / long was suggested by one member as an alternate. US zip codes were also considered. Following the European examples, one member suggested a more extensive exchange, RST, serial number, and then the 6 digits.

Initially, there were some concerns as to knowledge of a 6 digit locator. Many responses did not feel that education of a 6-digit locator would pose a significant

problem, however. In fact, once it was realized within the group that most of the participants in the 2009 Spring Sprints used 6 digit exchanges, 6 digits became the default exchange to use among group members. In a real contest environment, it was felt that contest participants would likely tell any person giving a 4 digit exchange to simply go to QRZ or other source to find a rough approximation of their 6 digit locator.

Perhaps including a note in contest publicity on computer programs that could translate lat / long into accurate 6-digit locators would be appropriate. Members did not feel there would be a need for an acceptable standard on verification of station location. Even though QRZ may not be overly accurate in some cases (due to the use of the zip code by QRZ to ascertain the 6-digits), one person felt that the potential error would be 15-20 miles at most. So long as the transmitting station would be consistent, it should not be a great concern. One easy to use web-site that gives both the 6-digit locator and distance from various points is: <http://f6fvy.free.fr/qthLocator/fullScreen.php>. Another 6-digit locator is at QRZ: <http://www.qrz.com/gridfinder>

As to what happens if the transmitting station only send a 4-digit locator, one person was in favor of disallowing the QSO. This is the general rule in Europe. Most others however favored accepting a 4-digit response. Early responses suggested to default to the center of the 4-digit square to generate the full 6-digits. Some people then supported a suggestion to use the closest 6-digit grid, if possible for the computer to do. For example, if FN20 was given out and the QSO was generally to the NW, the computer would assign FN20aa to the exchange. One person was concerned however with the complexity of this idea, and preferred to simply use the center of the 4 digit locator for distance calculations when 6 digits were not provided.

Another later proposal was to allow 4 digits, but mandate that people submitting a log indicate their 6 digit info so that the sponsor could more accurately calculate distance.

When the 1st simulation was run (see below), we became aware that some of the logging programs currently in use allow for both 4 and 6 digit exchanges. A few even calculate distances of either 4 or 6 digit info through a beam-heading function. Thus, the very real possibility exists that logging programs could currently handle a 6-digit distance event as well as 4 digits. Indeed, the 1st simulation effort used a current logging program to calculate distances and estimate the impact that distance scoring would have upon results.

One person then proposed allowing both 4 and 6 digit info, but that a nominal point bonus (1,000 to 5,000 points) would be given to anyone who consistently provided their 6 digit location. This would provide a positive incentive to use 6 digit info rather than discouraging log submissions or general contest QSO activity that mandated 6-digit locators on all log submissions or on all QSO's.

The 2010 Spring Sprints strongly encouraged but did not require the usage of 6 character exchanges. The vast preponderance of contacts used 6 digits on both sides

of the QSO. Many people who used 4 character exchanges in the 1st Sprints quickly learned their 6 digit locators, and were providing 6 characters by the 2nd Sprints.

Km or Mileage. Most responses favored the use of km for the assignment of points. Perhaps, the rules could be written as they are with the 10G, stating the distance in km and then having miles in parenthesis. “16 km (10 miles)” would be an example.

Whole numbers for km distance. Several responses had no problems with using decimals or fractions for distance calculations. One person suggested using decimals for distance calculations, but then rounding the final scores to the nearest whole number for reporting purposes. The computer logging program of individual contestants would only be an approximation of distance, in any event, with the sponsor’s program generating the official distances used for the results. Thus, any distance stated in the scoring output would be for the primary benefit of the contestant, and not affect the results.

Minimum Distance. Most favored no minimum distance for fixed stations, since we should not prohibit hams who are neighbors from communicating with each other. The impact of this would be negligible, due to very few distance points being awarded for a contact in close proximity. There was some concern expressed as to minimum distances on rovers, however. A 1 km distance was thought to be appropriate for a minimum on portables and rovers.

Categories. While categories are not directly related to distance based methods, there will likely be modest to dramatic impact upon various classes from distance events. Rovers and portables may become similar to each other. Portables could want to move around to multiple high locations, possibly with higher power. Rovers may make fewer stops, seek out high ground, and develop larger antenna systems. This argues for flexibility in category identification during initial testing of a distance concept.

Also, some members feel that the categories have become too segmented in the ARRL contests. There may be a general desire among members to see simplicity of categories if a new contest emerges from these discussions. This would increase the unique nature of a distance event.

On power levels, one member suggested that categories be rearranged by various ERP levels, rather than the current portable, SOLP, SOHP designations. A response thought that ERP calculations would make thing too complicated, however. Another suggestion was to use power levels as a multiplier instead of as a category. This would be similar to Field Day rules. Another proposal was to limit power to 200 W, making the event like the NAQP.

Other members objected to the limited class for both multi and rovers, stating that microwaves are effectively being discouraged by this category.

Another member suggested allowing a new op as a guest at a station without affecting the SO entry status.

Another member suggested the creation of an unlimited category or a CWAC for EME and digital MS. This would resolve the issue of EME as well as separating digital MS from other terrestrial modes. Assistance (PJ, other on-line activities) would be allowed in this category.

Other suggestions included the submission of logs from each grid (eliminating a rover or portable designation in the process); and having a separate category for more than one transmitter on the air at a time.

Contest length. Various suggestions were made. These included:

- A NA QSO Party format, 12 – 16 hours in length, with a dawn and dusk in the event (several favored a short length in this range).
- 18 to 24 hours.
- 24 hours, midnight to midnight.
- A longer event than the ARRL 33 hour period, something with 4 morning and evening periods (The ARRL has only 3 dusk and dawn periods).
- 48 hours, 8 PM to 8 PM Friday to Sunday.

Contest date. Many people favored either before or after the Es season, to minimize the possibility that 6 meter Es would distort distance scoring of other bands. Summer is also occupied by several VHF and HF contests.

March to May was a common preferred time frame. Late fall was preferred by others who are active on numerous things in the spring.

One person suggested a holiday weekend, with Monday then being available. The same person also suggested a series of holiday weekend contests, with a cumulative score between events.

Clubs / Teams. Several people liked the development of clubs in a distance event, as an effort to boost support for a contest. Two members felt that the club competition has distorted VHF contesting for some time, however, and would prefer not to have clubs. One member favored clubs but wanted the club circle waived for rovers, to encourage long distance activity among the portables.

Teams similar to the NAQP were suggested as a possibility. A team scoring rule would be unique to VHF, and could also formalize the quasi-teams that have developed by some multis and rovers, hopefully in a positive direction. There were several positive responses to a team approach, although several others were either

unfamiliar with the HF team rule or did not understand the concept at all. Two people wanted more information before they could commit to the team idea. Another response favored 3-5 station teams limited to each ARRL division, an "X" number of grid rings, or something similar to keep the teams local in nature. The same response did not favor a multi-op or rover on the team unless there was a separate team listing for rovers. Another response wanted all teams to have at one rover on a 2 to 6 person team, however. Still another suggested that a team consist of one member for each of the categories.

Use of FM. Without a request for comment, one person wanted to use FM simplex and the 2 meter FM calling frequency. Other members felt this has nothing to do with distance scoring, and in any event, would merely re-open a major debate from the 1970's. Another comment believed that the use of FM would only encourage close-in contacts in a contest that should be encouraging distance QSO's.

Logging program. The developer of RoverLog already has 6 digit capability for the 10G with distance calculations, and has indicated that he would work with any distance concepts developed from this working group. W2EV's program also can currently handle 6 digits and calculate distances. The W3KM VHF log also accepts 6 digits with distance calculation and beam heading. Another member has a DOS based distance program using the W3ZZ concentric rings approach that was written for VHFTEST (no longer available).

One response suggested contacting the developers of both N1MM and Writelog, since those logs are used by many contesters (same goes for CT and NA). Writelog may currently accept 6 digits. N1MM does provide distance and bearing information on the screen view, but with no written output. Another member stated that N3FJP indicated that he could program for distance efforts if there is a demonstrated need. The KM Rover program is very similar to Roverlog. Simulation 2 used KM rover to calculate distances. The Cabrillio Evaluator, developed as part of the N3FJP package, provides distance calculations in its output, and even totals and scores using distance measurements. It probably is the most adept of all programs tested so far in its distance abilities.

A distance calculator, Tiny-Locator, is freely available via the Internet and is the standard distance measurement for all VHF contests of the South African Amateur radio League. It calculates distances with 4 or 6 digits and provides lat / long info on the QSO's, as well. A program recently developed by a member, N9YH, also calculates distances and bearing info. Another member noted that WinGrid does the same.

Another distance calculator is BD2004. This was developed by Mike Owen (W9IP) and Paul Wade's (W1GHZ). It is used by the ARRL for distance measurements and is based on widely accepted spheroid models of the earth's surface (the "Clarke 1866 Ellipsoid") as opposed to presuming a 'perfect' sphere 40,000 kilometers in

circumference. It can calculate distances based on grid-4, grid-6, lat / long, or combinations. It is not intended to be a logging program however.

One group member suggested using distance calculation standards in use in Region 1, IARU. There is long-standing acceptance of these standards in Region 1. A VHF Managers Handbook form Region 1 is located in the file section of the working group. This handbook has contest, operational, propagation, and band plan information in it.

One member thought so long as programs would accept 6 digits, that contest sponsors would then have all information necessary to calculate the distances and scores on it's own. The general consensus was that logging programmers be encouraged to program as an option for: 1) 6 digit capability; 2) distance calculations; and 3) beam heading.

There was also the belief that logging programmers should use the same method of distance calculation, as the various programmed tested all returned slightly different distances for the same 6 digit exchange info. More work is needed to determine the appropriate method to use, but a standard way of calculating distances would be appropriate to eventually develop for both the logging programs and the contest sponsor.

Complexity. There is a preference by many group members to keep things as simple as possible, since distance scoring can become quite complicated unless efforts are regularly made to simplify matters. Note was made of the soapbox comments on both the 1982 UHF and 1987 1296 Spring Sprints. Computer logging may now be able to reduce some of the complexity associated with manual calculations of distances.

In order to avoid a long exchange, many people wanted just 6 digits. Others used to EU rules preferred a longer exchange that provided more information, such as 58124 AM29ag (5N report, serial number, and 6 digit). Most people felt that 5NN reports were useless. One comment suggested mandating a 6 digit exchange for purposes of uniformity.

Also, see the straw poll results (below) for the strong preference among group members for simplicity in distance rules.

Recent QST article on Distance Scoring. The distance scoring concept was covered extensively by Gene Zimmerman, W3ZZ, in his World Above column, May, 2009 QST (at 89-91). An outline summary of the article:

General comments / reasons for distance scoring –

- feels that VHF contesting has been diminishing, and may have stabilized but without upward movement

- no stagnation in HF contests
- The big three have the same format, with an emphasis on microwaves in the absence of strong 6 and 2 meter openings
- Current rules fail to address the most fascinating aspect of VHF contesting, that of long distance QSO's
- Current rules only encourage more QSO's across multiple bands; not long distance QSO's
- Distance metrics would be useful for stations in less populated areas
- Having a large number of stations geographically close would be less of an advantage
- Emphasis of big three would change from a microwave focus to more of a balance of microwaves and non-microwaves
- Grid circling problems may be minimized by distance rules

As to specific ideas –

- Reviews pure distance methods, and concentric rings
 - o Problem with Es on 6, with QSO's that are far but easy to do
 - o Possible problem with digital contacts, far but easy once programming knowledge is done
- Stew Perry handles problems by km zones; 500 km of Stew Perry might even be appropriate on VHF;
- W3ZZ runs thru a concentric ring / Stew Perry approach applied to VHF:
 - o Farthest Es and MS QSO's would have a natural limit as being part of the greatest zone
 - o Also uses grid squares
 - o Feeling that in a regular VHF contest, any event without grid squares might not be too popular;
 - o Three 3 grid rings
 - o Microwaves QSO's would only be in the 1st ring, and would not receive extra points
 - o Could reduce distance zones on 902 and above
 - o or could assign more points for farther zones reached on microwaves
 - suggests 3 and 5 points for rings 2 and 3 on 902, 1296; 4 and 8 points for 2304 and up
 - But ring 1 would still be worth 1 point for ALL bands
 - o Believes September VHF would be a good contest to implement distance scoring (apparently with concentric rings zones)
 - Minimize impact of Es in September
 - And have best change of enhanced tropo on 2 and above
- Also believes that August UHF should adopt the 10 G or SBMS distance rules

One person agreed with many of Gene's comments, including September and the use of grid squares, although there was a preference for 7 rings of 100 miles each and then a 7th ring of unlimited distance.

In early May, 2009, the WSJT and VHF reflectors had numerous comments regarding a small reference in W3ZZ's article regarding WSJT modes being based on the technical skills of Joe Taylor, W1JT. Almost none of these reflector notes focused on the main topic of the article, that of distance scoring. Rather, the discussion centered on W3ZZ's description of WSJT's abilities being related to skills of the software programmer. Since these comments were off topic, group members did not overly concentrate on them. For purposes of completeness however, the file folder of the working group contains some of these comments as well as a copy of the original World Above column.

Polling of Members

With many topics already being covered, it was felt that the working group should have sufficient knowledge and understanding of the issues to begin forming more definite opinions. Thus, a straw poll was conducted to ascertain support for various contests and distance scoring methods. Ranking of the contests, in order of preference, was encouraged. Stating the reasons for support of the various proposals was especially welcome.

Around 50% of the working group members (21 people out of 41) responded to the polling request. Additionally, one person circulated the poll to K8GP members who then provided two pages of comments. This was especially useful, as these comments came with fresh ideas that were generated outside of our own group discussions. These ideas were added to the following polling results, bringing the total number of responses to 25.

Preferred Contest. September and the August UHF were the most preferred, but support also existed for other contests and concepts. Results of the straw poll follow, along with more extensive comments on each event. Please note that some people provided multiple "first" choices, so the results do not exactly total the number of people responding.

Preferences for Distance Event

| Event | 1st | 2nd | 3rd | 4th | Wghtd ave |
|--------------|------------|------------|------------|------------|------------------|
| Sept | 8 | 2 | 1 | | 40 |
| UHF | 8 | 1 | | 1 | 36 |
| New | 3 | 4 | 1 | | 26 |
| Jan | 3 | 1 | 1 | | 17 |
| Any/all | 4 | | | | 16 |
| Sprints | 2 | 1 | | | 11 |
| June | 1 | | | 1 | 5 |
| FD | | 1 | | | 3 |
| CQ VHF | | | | | 0 |
| No change | 1 | | | | 4 |

The September contest elicited the most support for the development of a distance event. Many people felt that with little Es potential but significant chances for tropo on 2-meters and higher, September would be a good fit for distance efforts. One person felt that September was the one big event that currently needs attention – January has intense club competition; June and CQ VHF are now very popular; the UHF has good activity with Rovermania; but no one has a vested reason to get on in September. A distance scoring method in September would give the contest variety from other events and could become known as the distance contest of the contest season.

The August UHF also drew much support. Without 6 and 2 meters being available as potential skews on very long distance QSO's, this contest is thought to be ideal for distance efforts. Distance may draw more interest in this event, as well. Most of the participants are experienced operators who would generally appreciate an event focusing on achieving longer distances. It would also be a good match with the 10G that also uses distance scoring. One person was reluctant to experiment with the UHF however, out of fear that the momentum developed for this contest by NLRS and Rovermania may be undermined.

Developing a new event was also a popular option among distance group members. Several people wanted a new event as a trial run for distance methods, so that a mature rules set could be ultimately developed under contest conditions. A simultaneous single band event was often mentioned as an initial possibility, with gradual development of multi-band rules once matters were solidified in terms of a rules set. One person suggested an April weekend, to be held in conjunction with the WSJT Sprints and the 50 MHz Spring Sprints. Another thought that in general, a contest in April would be good, since there was a long dry-spell between January and June. Another person suggested October instead. Still another suggestion was to develop a cumulative event similar to pre-1948 VHF Marathons. A multi-band weekend event or a simultaneous, single-band contest was thought to be better than the Sprints, with this view, since people will make a bigger push for one event than a series of smaller weekly contests. Two people expressed concern with a new contest however, believing that it would be poorly attended and difficult to fit into a busy contest schedule.

One person suggested a new contest on the same weekend as the CQ VHF, although there was no express reference to CWAC. This response may not have been aware of CWAC possibilities, so the suggestion was to run two separate contests at the same time, one as the CQ VHF and the other as a new distance event.

January was also mentioned in some responses. With almost no chance of Es swamping out other QSO's, this time of year was thought to be good for an emphasis on multi-band distance scoring. The real value of distance based methods could thereby be determined, since skill levels at achieving distance would be more

important than being in the right place at the right time for an Es. One person felt that a uniformly bad event such as January would be better to attempt distance than in September, where the winner would be someone who would be lucky enough to catch a momentary Es on 6. Another response believed however that a good distance scoring concept would be wasted on terrible band conditions experienced in January. There was also some concerns expressed over impact to the club competition event in January.

The VHF Sprints also garnered some support. The Sprints were felt to be an ideal short-term platform to test out distance rules. This would be similar to the initial reason for the Sprints in 1983, to test out the new grid system. Once a rules set has been experimented with and developed further, distance methods could then be adopted in some major event.

Some people were in favor of the “all or any” approach, with the development of distance based scoring in as many events as possible, ARRL and CQ alike. These responses did not see the need for a gradual phase-in, but instead were in favor of quick adoption of distance scoring into the majors.

June was also noted in a few responses. One person wanted to eliminate 6 in a CWAC format, but then keep 2 meters in distance scoring. Another person wanted to keep 6 meters as well, believing that 6 would add a very interesting flare to distance calculations in the middle of summer. Another response did not feel June was appropriate for a distance event, since Es makes vast distances easy to achieve. Numerous comments favored contests other than June because of the possibility that Es in June would distort any distance scoring method.

Field Day was also mentioned twice as a candidate. The current VHF station on FD could be developed into a VHF type of distance event while the typical exchange would still be made on HF. This would give more of a reason for a VHF audience to participate.

One person did not want to change to distance scoring, since the rules have changed significantly over the years with no real change in log counts.

Preferred Method. Group members generally did not rank their preferences on this item, instead going into detail on various items. The following is a rough indication of preference by group members of the various methods:

Preferred Distance Scoring Method

| | |
|-----------------------|----|
| Pts per km | 19 |
| Pts per zone | 6 |
| Simult. single band | 3 |
| Concentric grid rings | 5 |
| Combination | 2 |

Several responses indicated a willingness to compromise or be flexible on the exact structure recommended. Several people also requested simplicity of rules and contest design.

Strong support exists for the points per km scoring method, followed by several other styles. Many believed this would be the simplest way to calculate distance. Others felt that combination events and zones were simply too complicated.

Some people did favor the points per km zone, with between 3 and 7 zones per band. Zones were criticized by several others as being too artificial in nature, as well as being too coarse.

Some support also existed for concentric rings, as this measure would be easy to implement in existing events. Several people however were repulsed at the concept, frankly, by the recognition that grids are not good distance measures since they are 1 x 2 in nature. One response felt that rings could be useful for initial development of distance scoring, with eventual conversion to points per km.

Other Comments. Several additional items were mentioned by group members in the polling responses. One person noted that the current system does incorporate distance concepts, as working farther distances through successively farther grids is a measure of distance. In fact, the original effort at moving from sections to grids in 1983 was in part designed as a distance effort, rather than the then current system of rewarding close-in contacts that may happen to cross state and section lines.

In a recurrent theme among many of the responses, several people suggested keeping the rules simple. The more complicated things are, the less likely will be the participation. What one response thought was simple, however, another found to be too complicated. For instance, some used simplicity to argue for concentric rings, while others thought anything involving grid rings or combination events would be too complicated. Thus, simplicity as well as beauty, may be in the eye of the beholder.

On a CWAC, several people did not want a dual contest structure, stating that it may be too confusing or unworkable. These responses also carried a definite preference for the implementation of distance methods into existing contest structures. Many others were more hesitant, feeling that a CWAC would be appropriate as a first step to gauge participant interest. Only if contesters liked a distance concept should conversion occur to a distance event. The general thought was to phase things in slowly, allowing people to experience and grow accustomed to both sets of rules. There were also some people who believed that existing contests could not be successfully converted, and therefore were not in favor of a CWAC, either.

Many responses included various details. Using a 6-digit exchange was considered very important for distance events, with calculation from the center of the 6 digit

locator. One suggestion on the exchange was for RST report, serial number, and six-digits. With the emerging realization that computer programs may be able to accept both 4 and 6 digit exchanges, two people stated that they would accept 4 digit exchanges, but that 6 digits should be highly encouraged. One person wanted results reported by grid, rather than sections. Another wanted multipliers for countries, states, etc. One person wanted FM banned while another wanted it specifically encouraged. Two people wanted base points for QSO's, as is done in the 10G and SBMS 2 GHZ, plus points per km.

Several responses noted issues regarding rovers. Some wanted a ban on rovers, favoring the EU style of distance contesting. Having a generic portable class was also seen as a viable alternative (similar to 10G and SBMS). Many others wanted to expressly keep rovers in distance events. Some proposed an "x" distance on re-contact of 50 to 100 km, while others favored re-contact on a grid-4 change. One person suggested a 50 odometer km travel before a grid could be activated. Another wanted to allow multiple re-contact to rovers in the same grid, but then only counting the farthest distance worked in each grid to and from the rover.

Two responses opposed grid multipliers, while two other people wanted grid multipliers to increase interest in working less densely populated areas. One person opposed band multipliers, while three people were in favor of band multipliers.

Simulations

One of the group members offered to work on a simulation of the impact that distance scoring would have upon VHF contests. With a simulation, the effect on actual contest logs from specific proposals can possibly be ascertained. Several people offered their contest log data.

Some of the group members felt that a simulation would not be of great value, since contest strategies would have been different had distance methods been used instead of grid multipliers. As far back as 1999 however, an attempt was made to estimate the impact that concentric rings would have upon multi-op stations (Zimmerman, CQ, April, 1999). A simulation with actual log data, rather than mere estimates, should be more accurate in ascertaining impact of distance rules. Rescoring past methods is important for purposes of validating models. There was continuing concern expressed however, that a simulation of distance scoring using historical data would not be overly useful since strategies would most likely change between the two contest sets. To alleviate this concern, it was felt that simulated results should be explored in more depth, with analysis given in the simulations to likely changes in participant activities during distance events.

Simulation 1. In April, 2009, a simulation was conducted on two logs of varying contest style and time periods. Described as Simulation 1, the effort focused on the statistical impact from various proposals surrounding band weighting and very-long

distance QSO's. The results of the simulation were by its nature very limited, as it involved only two logs using 4 digit exchanges, but the data was at least chosen to provide info on the impact of very long distance QSO's, 6 meter Es activity, and upper band tropo QSO's.

Findings of the simulation included:

- Some logging programs currently can calculate distances using 4 and 6 digit info, although it is awkward to do so.
- A no QSO or band weighting rule would vastly favor the two lower bands, so much so that upper bands and microwaves may be rather pointless to use.
- A gradual band weighting schedule (i.e. 1:10 over the 1st 10 VHF / UHF bands) would produce results that are somewhat similar to the point distribution of existing VHF contests using grids.
- Allowing very long distance QSO's without distance limitations would tilt or distort scoring towards those bands where such distances are possible, again so much so that no other bands would matter very much.
- If such QSO's are completely banned however, distance scoring would vastly undercount the activity on bands with long distance QSO's compared with current rules.
- Imposing some type or reasonable distance limitation on QSO's on all bands could potentially bring the scoring back to current levels of distribution between bands.
- A 5,000 km cap was tested, which generally approached current percentages of band contributions.
- Using distance km zones could potentially solve the difficulties with very-long distance QSO's and still allow distribution across bands that would be roughly consistent with current VHF contests.
- Distance zones suffer from the difficulty however of having arbitrary zone width and size on all bands. Much more work would be needed to develop appropriate zones in the US on all bands above 30 MHz.
- To deal with very-long distance QSO's, K5QE recommends a two-tier sliding scale of 1 point per km up to 2,000 km, and then 0.10 point per km thereafter.

Simulation 2. In May, 2009, a simulation was conducted of one log to ascertain the differences in distance calculations between 4 and 6 digits. A second logging

program, KM Rover was used in the effort, in addition to Roverlog. Findings of this simulation included:

- Distance calculations can quite capably be done with only 4 digits, with only modest changes occurring to distance scores when a move is made to 6 digits. There was only 3.1% (KM Rover) to 4.6% (Roverlog) difference between distance scores using 4 and 6 digit exchange info.
- 6 digit locators essentially increase the accuracy of the distance calculations. Thus, for purposes of accuracy, any event that will be based on distance calculations should ultimately use 6 digits as a standard exchange. But, using both 4 and 6 digits simultaneously is certainly feasible, especially during a transition phase to a distance event.
- Longer QSO's may show a moderate over-count, under-count, or no net effect on distance calculations when using 4 digits, depending upon where the home station was located within a 4 digit square and depending upon propagation.
- In general however, local QSO's may actually be farther off distance calculations when using 4 digits than are the longer QSO's.
- Thus, nearby QSO's often greatly benefit from an increase in accuracy when a 6 digit locator is used vs 4 digits.
- Distance calculations do vary by logging program.
- This distance scoring working group could and perhaps should work on developing a standard method in which to calculate distances.
 - o This would provide a uniform measure of distance calculations for programmers to ultimately incorporate into their logging programs, and would assist potential sponsors with an accepted standard to use.

Simulation 3. This study evaluated the impact that distance scoring would have upon rovers, as well as looking further into longer QSO's. The simulation was conducted on five logs of varying contest, year, class, and region of country. 34 separate simulations were conducted on these logs. The paper was written in May, 2009. Findings included:

- Rovers will likely not contribute as much to distance contests as they currently do in a grid-based multiplier system.
 - o This is due to rovers typically providing "close-in" contacts and needed grids to nearby fixed stations.

- Pack roving will be especially affected by distance scoring, due to the minimal distances between rover stations.
- Conversely, meteor scatter and EME QSO's will have a much larger impact upon distance events than they current have upon existing contests.
 - o This is due to the long distances that are possible with MS and EME QSO's.
- In order to contribute a higher percentage in distance events, pack rovers will have to spread out considerably, while individual rovers will have to emphasize longer QSO's rather merely than nearby contacts at grid intersections.
- More work needs to be done on what types of limitations, if any, should be placed on very long distance QSO'.
- Sponsors may want to ultimately mandate or highly encourage 6 digit exchange info, to avoid an over-count of distances form local fixed or rover QSO's giving only 4 digit exchange info.

Simulation 4. This was by far the most ambitious simulation conducted by the working group. Data on 28 logs was obtained from the 2009 June VHF QSO Party. This represented approximately 3% of the logs entered with the contest sponsor, and possibly a similar percentage of QSO's. The data from this simulation may comprise the largest data base collected on a single contest outside of the contest sponsors. The purpose of the simulation was to test baseline and alternate rules on a contest having good Es propagation on 6 meters. Findings of the study --- :

On Grid Exchange Information ---

- Grid-6 info increases the accuracy of the distance calculation by small amounts (1-5%).
- Grid-4 info is therefore viable for use in a distance event, but may affect individual standings within highly competitive classes.
- Distance calculations can also be methodically over-counted by local QSO's providing only 4 digit information in neighboring grids.
- Efforts should therefore be made to highly encourage or eventually mandate grid-6 information on both sides of the exchange.

On Points per Km Method ---

- 6 meter band activity in events with good Es propagation will very likely overwhelm distance calculations on all other bands combined.

- Band weighting reduces, but does not eliminate, this effect.
- A 5,000 km cap was tested, but was found to only affect a few logs with EME (and presumably, F2 or multi-hop). Even in these limited situations, the effect on 6 meter distance calculations was minimal.
- A sliding scale was also tested, and was found to impact many logs, but only reduced 6 meters distance calculations by small amounts (at least in an event with good, but not great Es propagation on 6).
- The stations that ranked well with current scoring rules also did well in any type of distance scoring. In fact, there was a close alignment in rankings within each class, regardless of whether ARRL rules or distance methods were used.

On Combination Proposals ---

- Contest activity becomes even more heavily tilted towards 6 meters with combination methods. This is likely due to the predominant amount of distance points being multiplied by the predominant amount of grids.
- A close alignment of station rankings also exists with the current rules and combination methods.

On the 10G Rules ---

- Applying the 10G rules to an August UHF type of event produces more balanced calculations across the VHF / UHF bands, for the same QSO's worked.
- Unique call-signs did not add much to the results however, as all fixed stations worked on each band produced unique calls.
- In general, the data was not ideally suited for testing the 10G rules, due to 2009 June logs being more oriented towards lower VHF band activity. Using logs from an August UHF contest is recommended.

Overall, distance-based methods may be viable in some instances. In particular:

- Distance scoring may be better suited for contests such as the January VHF Sweepstakes, VHF Sprints, and September VHF QSO Party rather than events with good propagation on the lower VHF bands.
- Distance scoring also shows promise in an August UHF type of event where there is no possibility of lower VHF bands overwhelming distance methods on other VHF bands.

Simulation 5. This used log data from four August UHF logs. The simulation was an outgrowth of Simulation 4, which tested 10G distance rules on a UHF-like contest using 2009 June log data. It was felt that June data may not be the best quality in which to test a 222 and above operating environment. Logs were then collected from the 2009 August UHF. Points per km, points per km with a 1:10 band weighting option, and a combination method of distance / band * grids per band were then compared against scores per the current ARRL rules. It was found that:

- Band contributions were more balanced than in events having lots of lower VHF band activity.
- Distance scores with band weighting came close to ARRL band percentages on both low bands and microwaves. Thus, the impact to any one band from a move to distance may be minimized in a distance event.
- Combination methods still skewed the results towards the predominant band used (222 or 432), to the detriment of the microwave bands.
- In general, distance methods may be viable in an August UHF type of event.

Simulation 6. Conducted in December, 2009, this effort studied a pack rover log (N6ZZ) that set a national rover record in the January, 2005 VHF Sweepstakes. The simulation compared distance results using 4 digit exchanges as well as an estimated 6 digit exchange. Conclusions of the simulation included ---

- 4 digit locators will dramatically overestimate close-in QSO's, producing big distance scores from logs relying heavily on rover-to-rover contacts. Using the more accurate 6 digit locators, pack rovers will generate much smaller distance scores.
- Thus, rover-to-rover contacts can produce a systematic over-counting of distance points using 4 digits vs 6 digits.
- Defaulting to the center of the 4 digit grid would over-count the distances, while allowing contesters to fill in the 5th and 6th character, after the fact, would provide an incentive to estimate the 6 digits farthest away from the contact.
- Allowing 4 digits for non-competing stations would be workable if a sponsor-developed computer program would then calculate to the nearest 6 digit locator possible. Such a software solution is advocated in the Model Distance Calculation Methods.
- Some group members have suggested a point reduction for any 4 digit info supplied. This may not be overly feasible however, as the effect of 4 vs 6 digit exchanges on the N6ZZ log was huge. A 50% reduction in distance points for 4

digit info would still provide an incentive for rover-to-rover operations to transmit and receive 4 digit info.

- Other group members suggest requiring 6 digits for rovers, but gradually phasing in 6 digits for fixed stations. This would solve the accuracy problem of rovers, but would produce different calculation rules for different classes, at least during initial phases of a distance contest.

Simulation 7. This examined the 2010 Spring Sprints, which in 2010 adopted the “pure” method of distance scoring, at 1 point / km. While earlier distance scoring simulations suffered from log data that was essentially optimized within a grid-based scoring system, this Simulation is the first of the seven simulations conducted that exclusively relies upon data from a distance-based event. Conclusions of the simulation included:

- No major disruptions occurred from the implementation of distance scoring into an existing VHF contest. Participation was up slightly from prior years. Contestants appeared to easily adapt to the new rules without many complaints.
- Usage of 6 character locators was far greater than anticipated. In part this may have been due to the “strong encouragement” of 6 characters for the last several years. But, the 2010 Sprints went a long way towards easing concerns of a more involved exchange.
- Commercially available computer logging programs are lagging behind the new Sprint rules, although the W3KM CAB-EVAL program is the most applicable from an administrative perspective. While the sponsor was able to manually adjust and edit log entries, the process will become problematic if bigger events are contemplated. Any potential sponsor of such future events should engage in advance coordination with one or more logging programmers.
- Log data was insufficient to evaluate the various proposed distance limits, as few if any contacts exceeded distance “break points” under discussion.
 - o Future Sprints rules should consider some type of distance “sliding scale” limits however, in order to avoid the possibility of strong Es, enhanced tropo, or an EME window to North America from overwhelming all contacts on the same band (for the single band events) or across all bands (for the cumulative award).
- In single-band comparisons, some divergence of results between distance and grid-based systems was noted on the higher bands. The lower bands showed high correlations between the results of the two basic scoring methods (distance vs grids).

- In the multi-band simulation, a strong similarity of results existed with whatever band weighting was modeled. Both scores and rankings were closely aligned regardless of weighting. This suggests that equal weighting of the aggregate or cumulative award may be sufficient in contests without Es, Au, enhanced tropo, or when the moon is not within view.
- As to band contributions, the simulation showed that without any significant Es on 6 meters, the various proposed band weightings do not overly affect the cumulative distance results as compared to grid based rules.
- However, 2 meters band contributions were dramatically higher than with simulated results of a grid-based multi-band contest. While 2 meters (and also 6 meters) band percentages were reduced as the band weightings were increased, 2 meters remained substantially over-weighted as compared against a grid-based system, for the exact same QSO's. It is largely a guess at this point, but this finding may be due to the basic nature of a single band event, where no stations at great distances were being passed to the upper bands.
- To more aptly model both distance limits and band weighting options, more extensive QSO data is needed, preferably from a larger multi-band contest.
- Overall, the 2010 Spring Sprints may show the validity and feasibility of single-band distance events in the United States. This also implies the validity of simultaneous, single-band distance contests.
- Before a true, multi-band distance event is implemented in the US, more testing and development of various distance limit proposals and band weightings is warranted, preferably using full log data from the contest that is being considered for distance scoring.

Appendix I – Supporting Documents

The following items are kept at the Yahoo User's Group on-line area of the Distance Scoring Working Group. Most of the documents are restricted access to members of the group, although non-members are provided read (only) access to group messages. Non-members can request access to supporting documents by sending an e-mail note to w9gka at yahoo.com.

Invitations to Join Working Group

- Announcement to VHF Reflectors, 2-09; 3-09
- Invitations to interested parties, 2-09

Working Documents

- Initial Comments & Ground Rules, 2-09
- Messages of Group Members, 2-09 and continuing
- Past VHF Reflector Messages on Distance Scoring, 7-08 to 2-09
- Numerous US and International VHF Contest Rules on Distance Scoring
- Historical Notes on Distance Events, 2-09
- Descriptions of Contests using Distance Methods, 3-09
- VHF Path Loss Technical Paper, 3-09
- W3ZZ 1999 and 2009 articles on distance scoring; VHF Reflector comments regarding W3ZZ 4-09 QST article
- Maps and Excel files on demographics of amateurs, by state and grid square
- Report of the Working Group (this document),
 - o Draft report, only circulated to working group members
 - o "Preliminary Report" with memo to VHF Reflector, 5-09
 - o "2009 Report", circulated to VHF reflectors, 9-09

Simulations

- Log data supplied from various working group members
- Simulation 1, April, 2009 (very long distance QSO's and band weighing issues)
- Simulation 2, May, 2009 (using 4 vs 6 Grid Locators)
- Simulation 3, May, 2009 (impact to rovers; longer QSO's)
- Simulation 4, August, 2009 (tested baseline and alternate rules with 2009 June log data of 28 + stations)
- Simulation 5, August, 2009 (tested distance rules with 2009 August UHF logs)
- Simulation 6, Dec. 2009 (tested 4 and 6 digits with pack rover log from Jan. 2005)
- Simulation 7, August, 2010 (distance scoring in Spring Sprints)

Appendix II – Proposed Baseline Distance Scoring Rules

The following is meant as “baseline” for the scoring methods, along with various alternates in parenthesis. Simulations can then gauge the impact of the baseline and alternates, leading to possible changes or revisions.

Baseline Rules and Alternates ---

1) The Exchange. 6 digit locator as exchange, required on both ends of the QSO.

Alternate A) Strong encouragement only for 6 digits, with no mandate. This has been used in the Spring Sprints since 2007.

Alternate B) 50% (or so) penalty for use of 4 digits on either side of the QSO.

Alternate C) Right of sponsor to deny a 4 digit QSO if sponsor believes distance over-estimation is occurring thru the use of 4 digits.

2) Re-contact allowed at each grid-4.

Alternate A) Re-contact every "x" distance. This follows the 10G distance rules. The most common proposed distance is 75 km, although the suggested range is running between 50 to 100 km.

Alternate B) dupes allowed in grid-4, but only longest QSO is scored. This was used in the 2010 Spring Sprints rule.

Alternate C) Little or no support exists for a complete re-contact ban that is common in EU.

3) No prohibition on any form or mode of communications.

- EME; MS; digital; FM; PH; CW; etc are all allowed and welcome.
- Current ARRL rules would still apply (e.g., FM simplex only and with ban on 145.62; passive only; no repeater, satellite, or aero contacts).

Alternate A) There is little support for a complete prohibition on FM (used in some international settings).

Alternate B) There is more support however for extending the US ban on 145.62 to FM simplex calling frequencies of ALL bands, including microwaves.

Alternate C) Some support exists for a prohibition on EME (common in EU).

4) Scoring Method.

- 1 point per km, with minimum distance for any QSO being 1 km.
- QSO's in the same grid-6 would be worth 1 point.
- EME QSO's measured in earth distance between stations, not distance to the moon and back.
- Spheroid calculations used as per model calculation standards in Report.

Alternate A) some support exists for combination of distance * grids.

Alternate B) some support exists for zones.

Alternate C) little support exists for concentric rings.

5) On Caps / distance limits, a 5,000 km cap was originally proposed.

Alternate A) A two zone, 2,000 km sliding scale, with 1 pt / km up to 2000 km, and then 0.1 pt / km > 2000 km QSO's;

Alternate B) A three zone, sliding scale.

--- On 6 & 2, 1 pt/km up to 500 km; 0.5pt/km between 500 km – 2000 km ; 1300 pts for > 2000 km;

--- On 222 +, 1 pt/km for up to 1300 km; 1300 pts per QSO thereafter.

Alternate C) is another 3 zone approach, but demarking between 6 and 2;

--- 6 meters, 1 pt/km between 1 km - 1000 km; 0.5 pt/km 1000 km – 3000 km ; 2000 pts > 3000 km;

--- 2 meters +, 1 pt/km up to 2000 km; 2000 pts > 2000 km

Alternate D) conceptual in nature with 3 zones similar to Alternate B or C above, but demarking across 3 bands of 6, 2, and then 222 and above;

Alternate E) Only a few people with EU experience or knowledge favor normalization (used in RSGB and Region 1).

6) On Band Weighting, a 1:10 band weighting for first 10 VHF bands produced similar results in simulations as with current ARRL QSO points.

Alternate A: 1:3 weighting, in 0.25 increments on each successive band (3.0 weight by 5.7G).

Alternate B: An equal weighting of 1:1 across all bands.

Notes ---

- Points per km had such great support in the polling of members that it should be considered the “default” baseline method to study further. There is some continuing support for a range of other ideas; thus, the alternate language.
- Allowing re-contact at grid-4 would dovetail nicely into existing contests, but potentially would carry grid circling problems into distance events; the “x” distance for re-contact would be consistent with the 10G rules, effectively making all stations capable of being a “portable” whenever they move “x” distance.
- The cap / limit is intended to prevent the very-long distance QSO's from overwhelming contacts involving more typical distances.
 - o A sliding scale of 1/10 point per km after 2,000 km was proposed by K5QE to address very long QSO's.
 - o A scale that changes in a more gradual manner is also possible, but would become complex to administer. Various alternates have been proposed. Such a gradual scale could essentially develop into a zone concept across all bands,. Computers could easily translate any sliding scale or zone into distance points without much inconvenience.
 - o A zone type of calculation was proposed and reviewed in Simulation 6, and is gaining support (3 zones for 6 and possibly 2; 2 zones for the upper bands; 2 versions of a zone are now contained in alternates, above).
- Band weighting is intended to prevent 6 and 2 meters from swamping out distance points on the higher bands. Weighting by bands in distance events is analogous to weighting by QSO points under the current grid-based system.

- In simulations, the 1:10 ratio approaches current QSO Party band contributions.
- Some support exists among group members for a more gradual band weighting schedule than the current QSO points of the ARRL contests. A 1:3 weighting has gathered support among individuals concerned with microwave QSO's dominating the scoring.

The major themes of a US effort at distance scoring include ----

- Distance scoring generates additional diversity of contest rules set,
 - Would encourage quality and quantity of QSO's, and harken back to the "golden era" of VHF where stations prided themselves on longer distance contacts rather than short range strategies;
 - Would also reduce monotony of the current rules set and possible burn-out from people who have grown tired of never-ending controversies of the current rules structure.
 - May encourage newer or cutting edge forms of communications (EME; MS; digital).
- Because of the dual goals of encouraging longer distances and having simplicity in the rules set, use points per km for scoring.
- But then effectively develop a 2nd or 3rd zone across several bands to address distortion problems of very long-distance QSO 's of F2, double hop Es, EME, MS, etc. Balancing the few, longer QSO's against the abundance of smaller distance QSO's is vital here.
- Use band weighting to further prevent normal propagation characteristics of 6 and 2 meters from swamping upper band and microwave distances; but be concerned about microwaves swamping everything else if band weighting is set too high. A careful balancing act would also be necessary here.
- In any evaluation of distance concepts however, need to stay continually aware of the numerous caveats and hesitations associated with distance - i.e. complexity of calculations; possible confusion over variety of rules sets; possibility of digital overwhelming things; etc, etc.

Appendix III - Possible Implementation Schedule for Distance Events

Short-Term to Near-Term ---

- Continue working on baseline rules
 - o We prove or disprove the usefulness of the baseline rules set through simulations.
 - o Ultimately, the baseline may evolve into a uniform set of rules for use in the US, making implementation easier for any VHF contest.

- Continue the Simulations
 - o This reduces the debate over various distance concepts to a statistical analysis of impact to scoring
 - o Hopefully, we can firm up rules that will be simple to use and consistent with overall objective of encouraging long distance QSO's.

- Work with one or more logging programmers to develop a program that can score distance scoring events using both 4 and 6 digit grids

- Work with sponsors to develop a points per km rule in some contest
 - o Use some contest as a testing platform for distance much as the Sprints were used initially with the grids
 - Use just a point per km rule, initially
 - CWAC in first contest, or moving directly to distance, depending on desires of sponsor

 - o Can refine / add / change rules to subsequent contests
 - Possibly, add in a sliding scale for long distance QSO's
 - Experiment with "x" distance on re-contact with portables
 - Maybe even develop a cumulative award on the Sprints, thereby allowing for experimentation of distance band weighting rules or normalization (via W2EV's thoughts)

 - o Developing distance based rules in a contest allows:
 - VHF community the opportunity to grow comfortable with distance rules,
 - Provide feedback from the participants
 - Testing the rules in a real contest rather than just a simulation

Near-Term ---

- CQ and / or ARRL begin to consider distance-based efforts in either current events or as a new event
- If national sponsors decline to develop a distance event, then possibly consider a new distance event or a CWAC sponsored by one to several local clubs and VHF Societies
 - o This would be similar to the Stew Perry that is sponsored locally

Near-Term to Long-Term ---

- If an experimental contest is well received, then consider a gradual phase-in to an existing major event or development of a new contest:
 - o CWAC as a possibility for a time; then if contesting community approves:
 - o points per km as the primary scoring rule, with rover re-contact at grid-4
 - o Eventually, consider an “x” distance for re-contact, moving to a 10G “pure” distance rule.
- Overall, the contest would emphasize long distances rather than near-by QSO’s and grids.
- One or more “pure” distance contests would increase variety of rules set and contesting experience while still maintaining current rules in other events.

Appendix IV – Model Distance Calculation Standards

It is intended that the following proposed standards serve as a uniform model to calculate distance. Working group members developed many of the following items. IARU Region 1 distance rules and the US 10G rules were also referenced.

1. The contest sponsor's methodology as to distance calculation shall govern. It is recommended that the sponsor disseminates its methodology, so that commercial logging programs can then emulate the sponsor's method of calculation.
2. Any commercial or user-side software logging program shall be considered only an approximation of distance calculation, with the sponsor's methods and programs being the official measurement of distance.
3. For the conversion from degrees to kilometers a factor of 111.2 should be used when calculating distances with the aid of the spherical geometry equation (Noordwijkerhout, 1987). The equation basically is: $\text{Distance} = 111.2 * \arcsin(\sin \text{Latitude1} * \sin \text{Latitude2} + \cos \text{Latitude1} * \cos \text{Latitude2} * \cos(\text{Longitude1} - \text{Longitude2}))$ where the conversion factor is 111.2 km/deg.
 - a. Note: Converting degrees to km with a spherical geometry equation is used in IARU Region 1. The equation is from e-mails of W2EV.
4. As to fractions of a km, or for same grid calculations, the following methods are recommended:
 - a. Integer values for km distances are used + 1 point for all QSO's. For example, 1.00001 km QS) is worth 1 km + 1 point = 2; 1.9999 km QSO = 1 km + 1 point = 2.
 - i. Note: This is based on IARU, Region 1 distance standards.
 - ii. Alternate: Allow the computing program to use fractions of a km for each contact, and just report final scores in integer value. Example: 1.00001 km would be worth 1.00001 points.
 - b. Where both stations exchange the same grid-6 or grid-4, 1 point is assigned to the QSO. This follows the above IARU example with 0.000000 km + 1 point = 1, or just assigning 1 point to same grid QSO's if the alternate is used.
5. Ideally, grid-6 exchange info should be required on both sides of the QSO.

- a. Where a grid-6 to grid-6 is exchanged, the distance is calculated from the center of the grid-6.
- b. Where one end of the QSO is a Grid-4 and the other is a Grid-6, the distance is calculated from the center of the Grid-6 to the center of the CLOSEST Grid-6 in the Grid-4.
- c. Where Grid-4 to Grid-4 is exchanged, the distance is calculated from the center of the CLOSEST Grid-6 to the center of the CLOSEST Grid-6.
 - i. Note: Sections b and c avoids an over-counting of distance that is possible if only a grid-4 is given, but is dependent upon computing logging program abilities to accomplish.
 - ii. Alternate on Sections b and c: for purposes of simplicity, calculate all exchanges from the center of the grid-4 or grid-6. Gradually phase-in a grid-6 requirement over several contests:
 1. Strong encouragement initially for grid-6, but grid-4 allowed on both sides of the exchange.
 2. Then, small bonus given for any stations submitting a log that consistently provides grid-6 info (or a point reduction for any station submitting a log with grid-4 info).
 3. Then, grid-6 required for stations submitting a log.
 4. Then, a reduction in distance points on any QSO's with grid-4 info on either side of the exchange.
 5. Then, grid-6 required on both sides of a QSO for the contact to be considered valid.

Appendix V – Recommendations

The following recommendations were developed by the working group in 2009, and were originally made part of an Executive Summary in earlier drafts of this document. The recommendations are meant as an overview of suggested avenues to take, with more specific proposals being contained in Appendix II and IV.

Recommendations on Preferred Contests

Recommendation 1. Experimentation of distance rules should occur in the short-term, either in a new contest or with the VHF Sprints.

Recommendation 2. The working group recommends that September, August UHF, and January contests be studied further for possible adoption of distance scoring rules in the long-term.

Recommendations on Preferred Methods

Recommendation 3. Points per km should be seriously considered as the appropriate measure of “distance”.

Recommendation 4. In multi-band contests, a gradual band weighting schedule should be given further consideration in distance events.

Recommendation 5: For very long distance contacts, various types of distance limits, such as a sliding scale, should be given further consideration.

Recommendation 6: Some type of re-contact rule should be given further consideration.

Recommendations on Administrative Items

Recommendation 7: Wherever possible, distance rules should be kept simple.

Recommendation 8. 4 digits may be viable on a near-term basis as an easy transition to distance events. Ultimately, 6 digits should be strongly encouraged on both sides of the exchange.

Recommendation 9: Contest sponsors should develop and announce a standard method by which distances will be calculated. This will encourage logging developers to use the same procedures. Appendix IV contains model distance calculation standards for further consideration.

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