

# **VHF Distance Scoring Working Group**

## **2009 Report of Proceedings**

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## ***Executive Summary***

### **Deliberations of the Working Group**

In response to a series of VHF reflector messages, the Distance Scoring Working Group was formed in February, 2009 to explore the possibility of a distance-based VHF contest in the United States. The working group is designed to be a “stand-alone” and grass-roots, independent body that studies various issues regarding distance based scoring. The following thoughts of this working group are being offered to the VHF contesting community in general, with national or local contest sponsors free to pick and choose any or none of the ideas that come out of this group’s deliberations.

This main text of 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, 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.

With several distance-scoring techniques to choose from, the first objective of the working group was to discuss the advantages and disadvantages of the various distance concepts. This evolved into a lengthy discussion of several specific distance methods. Eventually, the members were polled on their preferences. This led to the development of baseline rules, along with alternate proposals. Several simulations were conducted on these proposals. An initial status report was disseminated in May, 2009 to the VHF community.

Then, many group members attended the 2009 CS VHF Conference in Chicago. Informal discussions occurred there regarding the distance scoring concept. The highlight of these discussions involved comments made by John, K9JK, who indicated that he might be interested in using some form of distance scoring in the 2010 Spring Sprints. Group members were enthusiastic about this possibility.

It is anticipated that this working group will be active in promoting and participating in a distance-based Spring Sprints. Thus, what started out in February, 2009 as a project of a few months duration has now grown into a continuing resource base of individuals and documents having significant knowledge on the topic. Rather than developing an agreement on one, specific distance scoring method, a variety of options have emerged that the working group believes deserve further study and consideration.

With this document now sprawling over 50 pages in length, it was felt that the analysis should be simplified to a manageable level. Therefore, this Executive Summary contains a rationale for distance scoring, along with recommendations for any contest sponsor or the broader VHF contesting community to consider. Please feel free to read the entire document, as the following items only sketch out a broad outline of many details of distance scoring methods.

## **Rationale for Distance Scoring**

Many members of the working group favor the adoption of distance scoring in at least one major VHF contest in order to increase variety of the contesting experience. The uniformity of the current structure breeds a certain sameness that can lead to complacency and boredom. The fear is that such uniformity reduces current levels of contest activity. Conversely, by increasing the variety and diversity of VHF contesting, it is hoped and believed by many group members that contest participation will increase. This has been exactly the experience of the *CQ VHF* contest since 2000, when a 6 and 2 only format was developed. A distance event in the US would be on par with other specialty events such as the August UHF, the 10G, the EME contest, and the VHF Sprints. It is also consistent with the vast majority of VHF contests world-wide which are based on some distance scoring method.

Distance-based methods would emphasize operator skill and technical abilities by constantly reaching for longer contacts, rather than making a sheer quantity of contacts as with the current system. With this belief, the current contests place too much emphasis on simple QSO's instead of encouraging technical excellence.

With the sole exception of the 10G, the existing crop of US contests are multiplicative in nature (QSO's \* grid squares). With many distance methods, scoring is additive in nature, linearly increasing as distances are achieved. This minimizes contest strategies that are based on short-range QSO's in nearby grids. Indeed, it is difficult to imagine pack roving existing in its current format within a distance event. Even grid circling may be of little benefit to participants, at least circling to nearby grids that would add only miniscule distances to overall results.

Further, a distance event could be supplemented by awards such as a million km award accumulated over many contests. This could ultimately prove to be similar to the current VUCC award program. A box score on distance, almost identical to the distance boxes of the 1950's and 1960's World Above columns, is also feasible to consider through distance events.

As noted in the following section, Advantages of Distance Scoring, the traditional grid based system is certainly thought to be viable. As some members of the working group have regularly stated, adoption of grids squares in 1983 was viewed as a distance effort, with farther distance QSO's netting more grids. This was considered to be distinctly superior to the section and state system, which guaranteed a virtual

monopoly of results to stations concentrated in the North East Corridor. Additionally, as mentioned in the following section on Disadvantages of Distance Scoring, several potential pitfalls exist to distance methods, including complexity of rules structure, a mixed historical experience in the US, and lack of definite agreement on any single method of distance scoring.

Even with these concerns being acknowledged, a few questions become evident. Why must there be such a high degree of uniformity of contest rules in almost every VHF contest? Why can't there be at least one major contest that is expressly based on longer distances? Variety is the spice of life. A simple measure of distance harkens back to the "golden era" of VHF operating, when reaching for longer distances was seen as something glamorous and exciting. This is probably the largest and most significant reason to experiment with distance methods in the United States.

### **Recommendations on Preferred Contests**

Events in the Short to Near-Term. Several group members feel that either a new contest or experimentation with the VHF Sprints would be of benefit on a short-term basis. The VHF Sprints served as an excellent vehicle during the 1980's in encouraging the widespread adoption of grid squares. The Sprints could serve in a similar capacity again, with experimentation occurring on distance scoring. In fact, the 1987 Spring Sprints used distance scoring in its microwave week (albeit with mixed to negative results; see the below section on the Historical Evidence). One Sprint series (i.e. Spring) could use distance measures, while the other (i.e. Fall) continues with a grid-based system. This would provide interesting comparisons between the two events, and would further allow participants who only want to use the current system to continue their activities.

A new contest to be held around the same time as either the Spring or Fall Sprints is also an option over the short-term. One member suggested having a simultaneous, single-band event on the same weekend as the 50 MHz Sprints, and to coordinate a WSJT Distance Rally in the same time slot. This would generate three different contest formats at the same time, would almost certainly generate operator activity in a distance event, and would be very similar in style to many summer weekends in Europe where numerous and varied VHF contests occur across the continent. With this view, the VHF sprints or a new contest could be a better place to test out distance rules than a CWAC. Once rules are perfected in such an atmosphere, movement could occur to a major VHF contest. More specifics on possible implementation schedules are detailed in Appendix III.

*Recommendation 1. Experimentation of distance rules should occur in the short-term, either in a new contest or with the VHF Sprints. The Distance Scoring Working Group supports suggestions to use distance scoring in the 2010 VHF Spring Sprints.*

Events in the Long-Term - September, August UHF, and January. While there is some support for adopting distance scoring in many different VHF contests, solid support exists among the working group for the following events.

The September VHF QSO Party has limited 6 meter Es but good amounts of upper band tropo, so propagation characteristics of this contest are ideal for a distance-based measure to be conducted without much distortion occurring from lower band Es and F2. In fact, after Simulation 4 decisively showed that 6 meters would overwhelm all other bands in contests having good Es propagation, working group members developed even more of a preference towards non-summer events.

September may also be the only VHF contest that does not currently have a natural constituency. January has intense club competition; June and CQ VHF are booming in popularity; August UHF now has Rovermania; and even the 10G and EME have operators dedicated to the events. September could develop into an event devoted to distance methods.

The August UHF is even more suited in many ways for distance efforts. Without 6 or 2 meters to contend with, the concern over distortion from very long distances is largely eliminated. Most participants are technically sophisticated, and reaching for longer distances and usage of 6 digit locators would easily be within operator capabilities. It would thus be a relatively simple matter to adopt the 10G rules for August. The UHF and the 10G could jointly be seen as the distance events of the calendar year.

As a result of distance simulations showing difficulties with contests having significant Es, support has grown for the January VHF Sweepstakes. With almost no Es ever occurring in January, distance scoring could be utilized in this event across all VHF and UHF bands.

Depending upon the reception given by the VHF community to distance scoring in the Sprints, distance may become viable for one or more of the bigger VHF contests.

*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**

Points per km. While a wide variety of distance-based methods exist, there has been regular and strong support for using 1 point per km for scoring. It is a simple system that directly encourages stations to work longer distances. The success of this method has been demonstrated in numerous international events, to the extent that it must be

considered the default distance method currently in use around the world. The method is generally consistent with the 10G rules used in the US, as well.

Other methods, such as points per km zones, were considered, but were thought to be overly complicated. Concentric rings were also reviewed, but were seen as distorting distance measurements along a North-South alignment, as well as also being more complex than points per km. See the following discussion on Impact to Contest Structure.

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

Band Weighting. With any distance measurement, the issues of band weighting, long distance QSO's, and distance to re-contact remain.

A no band weighting option was explored in Simulation 1. Without band weighting, the two lower bands completely overwhelm QSO's on all other bands. This was true for 6 Meter Es, 6 meter meteor scatter without Es, or 2 meter EME (and even with a 5,000 km cap in place). Various band weights were then considered, with a preference for something that was more gradual than the current QSO weights of the ARRL VHF contests. A 1 to 10 weighting for the lowest VHF / UHF bands from 6 meters to 10G (and then a weight of 10 thereafter) approached contributions by band of the current ARRL events.

Simulation 4 demonstrated however that much of the intense discussion regarding band weighting and long distance QSO's may be somewhat misplaced. The decision to move to distance based scoring has a much greater impact on results than any decision on band weighting or long distance contacts.

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

Very long distances. This was initially a difficult issue within the working group, as F2, Es, EME, and even MS all have the potential to distort and render meaningless any distance measures of the more typical tropo QSO's. While this was thought to mostly be a lower band problem, the same situation would occur on 432 and 1.2G if EME-capable stations would operate on these bands. Some members wanted to ban EME contacts entirely (as is the case in some EU contests), while others felt that any ban or limitation on distance would be counter-productive in contests based on achieving longer distances. Additionally, if one form of contacts would be banned (i.e. EME), then the ironic situation could occur that a similarly long F2 contact would still be allowed.

Gradually, a desire developed among many group members to keep very long distance QSO's in distance events, but there was a continuing request to limit the points awarded in some fashion to prevent distortion from the longer contacts. In

particular, the potential from the new digital modes was thought to be so great that distance contests could degenerate into “de facto” MS and EME events, rather than the current concern that the grid-based contests are “de facto” microwave affairs. There may be an inherent weakness to any contesting system, be it distance or grid-based.

A 5,000 km cap was simulated with some success on the effect from very long distance QSO’s. Such a cap began to approach current band contribution percentages. A few members felt that any distance cap would be arbitrary in nature, although some international events do have a maximum cap on distance.

A sliding scale was then advanced, with 1 point per km being awarded up to 2,000 km, and then 0.10 point thereafter. With this proposal, there would always be some incentive to engage in longer distance QSO’s, while the ability to distort overall results would be limited. Such a sliding scale was also felt to be consistent with Es and F2 contacts actually being easier than the shorter tropo distances, at least when 6 meter band openings occur. It would essentially be a very limited form of km zones, with the development of a second zone beginning at 2,000 km.

Both a cap and a sliding scale were modeled in Simulation 4, with only modest impacts upon 6 meter scores being noted. After this simulation was conducted, some of the controversy regarding distance limits diminished among group members. More concern was expressed as to which contest was appropriate for distance methods.

Different distance limits on various bands also might be needed. While a 2,000 km sliding scale might be feasible on 6 and 2, if the same distance was used on higher bands, EME contacts would still overshadow all other contacts, especially when band weighting is considered. Conceivably, there would have to be various sliding scales for several different bands (e.g., 2,000 km for 6 and 2; 1,500 km for 222 through 1.2G; 1,000 km for 2.3G and above).

More work is needed on this issue. In general, a sliding scale is thought to be a workable solution that allows the longer contacts to remain in distance events without distorting distance measurements. Such a scale can be very simple (0.10 points per km after 2,000 km) to the very complex (separate non-linear equations for all bands).

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

Distance for Re-contact. With almost any form of distance scoring, the question arises as to movable stations. Some EU events ban any re-contact potential, while other contests allow rovers and portables so long as their movements are curtailed either as to duration of move or distance of move. No international rules expressly provide for a US type of rover operation.

This may largely be due to differing historical developments in the two scoring systems. In the US, mobiles developed as far back as the 1950's as a way to take advantage of nearby states and sections. In the late 1980's, mobiling across various grid squares was commonly done with different QRP portable log entries for every grid encountered. The rover class was developed in large part to wean mobiles away from sponsoring SO and multis. In Europe, with no incentive for grid circling being possible, mobiling was seen as an unnecessary distraction from pure distance methods. Movements were generally restricted to mountain-top portable locations, if any movement was allowed at all.

Some working group members familiar with international contests actually favored a no re-contact rule. Most members felt however that a complete ban on rovers was simply untenable in the US. There was also the concern expressed that the US has much larger open and unpopulated spaces than in Europe, and thus rovers serve a more critical purpose in the US than in densely populated countries.

Two principal versions of re-contact were advanced within the working group. The first idea was providing for an "x" distance of travel before re-contact could occur. This is similar to the 10 mile (16 km) re-contact rules of the 10G contest. Varying distances of 50 km to 100 km were suggested for the "x" distance. Members who desired at least one US "pure" distance event generally favored an "x" distance. Allowing re-contact upon movement to a new grid-4 was the second version that was suggested. Many members who were rovers or bigger stations who sponsored rovers were generally in favor of this proposal.

This area also needs more discussion. For transitional periods, or where there will be overlap with existing contests, re-contact upon grid-4 movement would allow for an easy continuance with current grid-based rules. Those favoring an "x" distance have recoiled at a grid-4 re-contact however, believing that grid circling and captive rover controversies will now spill over to distance methods. If a "pure" distance event is contemplated by contest sponsors, the most eloquent re-contact provision would probably be an "x" distance. Thus, the exact type of re-contact allowed would largely be dependent upon the form that the distance event takes.

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

## **Recommendations on Administrative Items**

Simplicity. Throughout the discussions, group members expressed a strong desire in keeping the rules simple and direct. Some members suggested using the 10G as a distance-based example of simplicity. Even though the issues covered by this report have been extensive, the final output should be eloquent in its simplicity. This is a primary reason why the km zone concept did not receive much support from group members – zones were viewed as being too complicated and artificial in nature.

Likewise, using highly involved mathematical equations could equitably solve issues involving long distance QSO's and band weighting, but was also viewed as being overly complex.

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

4 vs 6 Digit locator. Universal support among group members exists for the usage of 6 digit exchanges. In simulations run on the issue, only a 1 to 5% variance in scores existed between distance measured by 4 digits on each end of a QSO vs 6 digits on each end. Without question, 6 digits provide greater accuracy of distance, but continued usage of 4 digits by casual operators would probably not be a major impediment in the development of a distance event.

One concern does exist on usage of 4 digits. Simulations 2 and 4 demonstrated that local QSO's systematically over-count distances. This is due to nearby QSO's typically being closer to each other than the center of the grid-4. If local, casual stations would methodically not provide 6 digit information (such as a rover or local fixed stations assisting a major SO or Multi), then the over-count may be enough to boost standings in a category that is very competitive.

Several ideas were considered to encourage the usage of 6 digits. This included a simple mandate of all QSO's being in 6 digits (the EU rules); mandating 6 digits for any log submissions; having a bonus for any log submission that consistently gave out 6 digits; having a small penalty for any sent (and / or) received 4 digit; and using the nearest 6 digit locator to the other station, if 4 digits were used. Possibly, a sponsor could work on a progressive adoption of 6 digits (i.e. start with simple encouragement; then a bonus for 6 digits; then a penalty for 4 digits; then a mandate on 6 digits for log submissions; finally mandate 6 digits for both sides of a QSO).

*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.*

Distance Calculations Methodology. The simulations have shown that some logging programs currently calculate distances based on both 4 or 6 digit grid squares through a beam-heading function. Another free-ware program, Tiny-Locator, also calculates distances based on grid squares or lat / long coordinates, but then does not provide a logging function. Another program used by the League, BD2004, also calculates distances. Two logging developers have stated to working group members that they will work with contest sponsors in developing a logging program that is compatible with distance-based rules.

All of the programs tried out so far produce slightly different distance results for the same, identical grid square inputs, however. Various mathematical computations evidently exist in these programs. This is one area where the current rules may be a bit too simple, or at least non-descript and incomplete.

Standard ways should be developed in handling both 4 and 6 digit exchanges (i.e. from the center of the grid or sub-grid). Whether the distances are calculated as a straight line, or as part of a spherical distance (as is done in some international events) should also be decided upon. Uniformity of EME distance calculations is also appropriate (i.e. distance between earth grids vs distance back and forth to the moon). The distance assigned to 4 x 4 exchanges (or 6 x 6) within the same grid (or sub-grid) should also be considered. While the calculation method used by a sponsor would certainly be the final decision as to “distance”, a standard mathematical calculation for everyone to follow is warranted, if nothing else, to avoid unnecessary confusion as to distances achieved.

*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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## ***Development of Working Group***

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

Invitations to join were sent to the VHF Contesting Reflector, the VHF Reflector at Stanford, and the WSJT Reflector. Additional invitations were sent to the G-QRP reflector, in an effort to attract UK amateurs. Numerous individual invitations were also sent out. Close to 40 people quickly joined, and the user's group has been quite active since that time.

Numerous examples of contests that have used distance scoring were uploaded to the file folders of the working group. Past comments on the topic contained at various VHF reflectors were also uploaded, for reference purposes. A file containing an historical review of all past US VHF contests was included, as well.

An agenda was established for the group of issues to discuss. Members of the working group provided substantial comments and observations on each of these items. The comments are summarized in following sections.

## ***Composition of Group Members***

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.

## ***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”;
  - o 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.
- 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**

*Initial Note: Due to time constraints, this section has so far not been extensively discussed by the working group. This section largely represents analysis and views of the moderator of the group, Kevin Kaufhold, W9GKA.*

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.

## ***Specific Issues***

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

### **The Lower VHF Bands**

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. It could end up being a distance based version of the VHF Spring Sprints, only run all at one time and maybe with a longer time period. 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.

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 1<sup>st</sup> 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 1<sup>st</sup> 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.

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 things 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 soapboax 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

- Feeling that in a regular VHF contest, any event without grid squares might not be too popular;
- Three 3 grid rings
- Microwaves QSO's would only be in the 1<sup>st</sup> ring, and would not receive extra points
- Could reduce distance zones on 902 and above
- 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
- 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 7<sup>th</sup> 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 purposed 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

<u>Event</u>	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>Wghtd ave</u>
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 testers 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.

The simulation examined the following issues:

- The ability of logging programs to calculate distances with either 4 or 6 digits.
- The impact of band weighting upon distance scores.
- The impact of very long distance QSO's upon distance scores.
- Comparing the current ARRL rules, with points per km and points per km zone.

Major 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 1<sup>st</sup> 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 naysay 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.

## **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)

## ***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 ---

- 6 digit locator as standard exchange (4 vs 6 grid exchange tested in Simulation 2 and 4).
- 1 point per km (tested in all Simulations)
  - o Alternate: Combination of distance per band \* grids per band and across all bands tested in Simulation 4.
  - o Alternate: 1 point per km on UHF-like contest done in Simulations 4 and 5.
- Caps and limits
  - o 5,000 km cap and 2,000 km sliding scale tested in Simulation 4; MS and EME examined in detail in Simulation 3.
  - o Alternate: a more comprehensive and gradual sliding scale across distances and across bands based on propagation abilities of the bands (still a concept, to date).
- 1:10 band weighting for first 10 VHF bands between 6 meters and 10G; all bands above 10G would be at 10, as well.
  - o Tested in Simulations 1, 4, and 5.
  - o Alternate: A comprehensive and potentially non-linear scale for each band that effectively incorporates limits and weights for all bands (still a concept, can be combined with sliding scale alternate, above).
- Rovers allowed re-contact at each grid-4 (assumed in all simulations).
  - o Alternate: Re-contact every 50 to 100 km (not able to test using data from current rules).

### 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.
  - o There is some continuing support for a range of other ideas; thus, the alternate language.

- The cap is intended to prevent the very-long distance QSO's from overwhelming contacts involving more typical distances.
  - A sliding scale of 1/10 point per km after 2,000 km was proposed by K5QE to also address very long QSO's.
  - A scale that changes in a more gradual manner is also possible, but would become complex to administer. Such a gradual scale could essentially develop into a zone concept across all bands, complete with band weighting incorporated into the zones. A non-linear equation that increases the point per distance but at a decreasing rate would be a continuous, smooth gradation that could be coordinated with propagation abilities per band. A zone table would then be considered an approximation.
- Support exists among group members for a more gradual band weighting schedule than the current QSO points. A 1:10 band weighting has been developed as the baseline for simulations.
- 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.
- In summary, we may be seeing the best of the scoring methods emerge from these discussions.
  - Because of the overall goal of emphasizing longer distances and the desire for simplicity, use points per km.
  - But then effectively develop a 2<sup>nd</sup> zone of 1/10 point per km at 2,000 km to address distortion problems of making some very long-distance QSO's via F2, Es, EME, MS, etc.
  - Have band weighting to further prevent long distances of the lower bands from swamping upper band and microwave distances.
  - For ease of transition to a distance event, use grid-4 for re-contact in existing contests;
  - Possibly use an “x” distance in a new event or as a LT conversion of existing contests to a “pure” form of distance.

## ***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:  $\text{Distance} = 111.2 * \arccos(\sin \text{Latitude1} * \sin \text{Latitude2} + \cos \text{Latitude1} * \cos \text{Latitude2} * \cos(\text{Longitude1} - \text{Longitude2}))$  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 QSO 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.