Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington DC 20554

And
THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
Washington DC 20230

In the Matter of
Federal Communications Commission Seeks
Public Comment on Creation of a Spectrum Sharing
Test Bed

ET Docket No.06-89

Comments of Rockwell Collins Inc.

Introduction

Rockwell Collins Inc (RCI) submits these comments in strong support of the Spectrum Sharing Innovative Test Bed described in the public Notice June 8, 2006 by the Federal Communications Commission (FCC) and by the National Telecommunications and Information Administration (NTIA).

Comments submitted by other interested parties have not addressed the frequency congestion that occurs within the military frequency band segments. Our approach for a Test Bed is to address this issue and provide measurable relief to our military users. Airborne military users have unique problems; among these are variable net connectivity, "hidden transmitter"

issues, and users having a need to join the network rapidly (few seconds) to gain full connectivity without interference to other users.

Spectrum selection for Test Bed evaluation.

Our experience is in military communications in the 30-88 MHz band, 225-400 MHz band, 969-1206 and 1350-1850 MHz bands. The 225-400 MHz band is the single most critical spectrum resource for military tactical forces, both nationally and within NATO. The DOD operates approximately 75,000 radios supporting its operational requirements in this band. Extensive peacetime training and exercises use this band. This band is standardized within US military forces and our NATO allies in Europe. It is extensively used for a variety of functions including forward area tactical relay, airborne air-to air, land based and airborne satellite communications, and air traffic control.

Successful results of the Test Bed within this portion of the spectrum will provide the military with greatly increased use of the spectrum and provide relief to the needs of military users. . We suggest that the Test Bed initially use a portion of the 225-400 MHz band. We suggest at least 100MHz portion in the 225- 400 MHz segment. Monitoring of the spectrum at our location indicates that it is possible to increase traffic within this band segment by at least 10 fold using dynamic frequency reuse.

We also respectfully suggest use of the entire 1240-1390 MHz segment for test bed experiments. Periodic spectrum monitoring at our location using both ground based and airborne equipment to 35, 000 feet indicates that this segment has less much less than 1% usage over the last four years.

If the Test Bed can demonstrate significant reuse of the 225-400 MHz segment, spectrum without interfering with existing users, then the spectrum reuse experiment should be expanded to the entire 225-400 MHz band. Metrics shall include but not be limited to the amount of traffic transferred and any detected interference reported by first users. The Test Bed shall incorporate ground-to-ground, ground-to-air and air-to-air communications as part of its scenario testing. Air to air communications is critical for the military.

Transmissions from airborne platforms will cause the test bed to be more complicated than a totally ground based scenario. Potential interference to present users will be greater as airborne transmissions travel much further than ground transmissions. This **must** be part of the evaluation to have meaningful results.

Test Bed Dynamics

RCI suggests that the Test Bed focus on reuse of spectrum by dynamic monitoring of selected portion of the spectrum and for the Test Bed to generate traffic on those frequencies not used (detected) by others. The Test Bed system should dynamically reconfigure its spectrum use by frequent periodic examination of the spectrum. The Test Bed should be configured having both airborne and ground stations transferring traffic among all units. Use of airborne units addresses the "hidden transmitter" problem wherein some users may not "hear" another unit transmitting and therefore my use that frequency inadvertently. The test bed should address this problem.

RCI recommends that the test bed should be configured as a fully connected network so that if a single unit within the group fails, the system shall continue to operate properly with the remaining units. This infers that the test bed shall not use a "hub and spoke" configuration. This is important as failure of one specific unit may cause the system to fail and may cause harmful interference to "first users".

If the Test Bed experiments show that spectrum usage can significantly increase without interference, the NTIA and FCC should develop a process/procedure that provides authorization for additional users sharing a common spectrum, frequency or bands of frequencies without extensive filing and authorization requirements.

Related Experience

RCI has considerable experience in distributed airborne-ground networked communications. Our military programs include Tactical Targeting Network Technology (TTNT) which as demonstrated multi-megabit data communications between fully connected airborne and ground stations in the 1350-1850 MHz band. This network uses a distributed dynamic connection protocol, ideal for rapidly moving airborne and ground stations. The signal-in-space is frequency hopping which is an ideal approach to demonstrate non-interfering reuse of spectrum. RCI is also developing for DARPA the QNT system connecting together ground and airborne assets using a dynamic network protocol using the frequency bands from 225-400 MHz and 1350-1850 MHz. RCI is also a supplier of Joint Tactical Information Distribution System (JTIDS), otherwise known as Link-16, a frequency hopping system providing fully connected network. Link-16 operates in the 969-1206 MHz band, sharing spectrum with TACAN, IFF and other users on a non-interference basis.

Additional Spectrum candidates:

Airborne and ground spectrum measured at our location in and above Cedar Rapids, Iowa indicates that other candidate bend segments between 1429-1452 MHz, 1492-1525 MHz and 1670-1710 MHz should be investigated for "shared" use.

Test Bed location.

RCI suggests that the Test Bed be located near an area that has significant military communications traffic, perhaps near an Air Force or Navy base or training range.

Licensing

RCI believes that the experimental license be the mechanism of authorization as this process is already well defined. Experimental licensees are required not to interfere with existing users and this is exactly the focus of the Test Bed experiments, to increase spectrum use without interference and be capable of operating with interference from other users. RCI recommends that the license not be limited to a specific area as a series of experiments may be located at different geographic locations over the period of experimentation. RCI would like to conduct a series of experiments at Air Force and Navy training bases within the entire continental US. (CONUS).

Multiple Test Beds.

It is to the advantage of the government to award multiple contracts for the Test Bed as different companies may have different objectives and different approaches.

Attendance

RCI encourages personnel from FCC and/or NTIA to attend and are welcome at any and all experiments.

Proprietary technologies

Proprietary technologies should be encouraged as long as they comply with the spirit of the experiments. If the tests are government funded wholly or partially, the government shall have non-exclusive, no cost rights to the utilized technologies. This may or may not be necessary; other technologies that may not be proprietary may be employed as alternates.

Reports

At periodic intervals and at the conclusion of an experiment or series of experiments, the contractor should provide a report or reports identifying the objectives, metrics used and results of the experiments including existing spectral usage, physical scenarios, amount of increased traffic and other attributes. It is expected that there may be a series of reports during the

period of the contract. The test bed operator should be mindful of other users using the band segments and should gather potential interference complaints, validate them and include them in the reports.

Conclusion

RCI fully supports the creation and implementation of spectrum sharing test beds. The successful results of the test bed experiments will lead to greatly increased spectrum utilization and provide greatly increased capabilities especially for our military forces. RCI hopes that the FCC and NTIA will fully support these initiatives which will lead to earlier implementation and deployment.

Respectfully submitted

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