

**Before the
Federal Communications Commission
Washington, D.C.**

In the Matter of)	
)	
Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band.)	ET Docket No. 02 - 380
)	

**COMMENTS OF
DATA FLOW SYSTEMS, INC.**

Data Flow Systems, Inc. (“DFS”) respectfully submits its comments in response to the Notice of Inquiry (“NOI”) issued by the Federal Communications Commission (“FCC” or “Commission”) regarding allowing unlicensed devices to operate in the TV broadcast spectrum and other bands, such as the 3650-3700 MHz band.¹ Specifically, the FCC solicits public comment on: (i) the “feasibility of allowing unlicensed devices to operate in the TV broadcast spectrum at locations and times when spectrum is not being used, and on the technical requirements that would be necessary to ensure that such devices do not cause interference to authorized services operating within the TV broadcast bands,”² and (ii) “the feasibility of permitting unlicensed devices to operate in other bands, at power levels significantly higher than the maximum permitted for unlicensed devices in other frequency bands, with only the minimal technical requirements necessary to avoid interference to licensed and incumbent services.”³

¹ FCC 02-328, 68 Fed. Reg. 2730 (Jan. 21, 2003). Time to comment extended by Order, DA 03-1022 (rel. Mar. 31, 2003).

² NOI at ¶ 1.

³ *Id.*

I. Background.

DFS manufactures, assembles, installs and provides support services for Supervisory Control and Data Acquisition (SCADA) systems for the water utility industry. DFS's SCADA system is radiotelemetry-based (i.e., the radio transmission of data from a remote source to a receiving station for recording and analysis). DFS was founded in 1981 and has grown to become the largest provider of SCADA systems for potable, reuse, and wastewater monitoring applications in the Southeastern United States. DFS's SCADA system supports the operations of utilities ranging in size from large public water utilities that serve hundreds of thousands of customers to smaller rural water cooperatives and water districts which serve only a few thousand customers each. Each of these utilities depends upon reliable and secure SCADA communications to assist them in carrying out their public service mission.

Across the United States, numerous users such as electric and water utilities and pipeline companies have become dependent upon radio frequency-based SCADA systems to monitor and remotely control the operation of their infrastructure delivery systems. SCADA systems of this type monitor via radio communication critical equipment, such as pumping stations, relays, and measuring devices, located and operating at geographically dispersed and frequently remote sites, retrieving critical data and processing and monitoring the data for anomalies.

In the event of a fault, SCADA systems automatically respond to protect the health and safety of the public and a utility's delivery infrastructure by independently issuing alarms to appropriate public safety authorities, the utility's operating staff and maintenance personnel. Further, SCADA systems automatically initiate actions such as the opening/closing of valves and/or the throwing of electrical switches to isolate a problem and prevent it from cascading into a catastrophic event.

DFS is developing a new generation of SCADA system that is intended to thrive in a congested frequency environment. Like other DFS SCADA systems, the new system will utilize low power. In addition, consistent with the Commission's concepts underlying this proceeding, the DFS system will employ a frequency selection process that will both avoid known primary users' principal operating channels (e.g., those channels from a block allocation actually implemented in a particular locale) and also monitor and thereby avoid transitory operating channels.⁴ Undoubtedly, both the principles at issue in this rulemaking and the technology being developed by DFS will have application beyond SCADA systems.

II. Comments.

A. Increased spectrum sharing.

The concept underlying the NOI is that the radio spectrum can be shared to a far greater extent than presently exists. The television broadcast spectrum provides a prime opportunity for enhanced utilization due to the separations enforced between broadcast stations. While those separations are important to protect the integrity of individual station operations, they also provide substantial "white space" which can be utilized by other users, operating at locations and with power levels much lower than the broadcast stations, which will not cause interference to the primary service. Such secondary use has been allowed in other services, to both the primary service licensees and to other users.⁵

⁴ See NOI at ¶ 16.

⁵ See, e.g., 47 C.F.R. §§ 73.665-73.669 (TV aural baseband subcarriers); 47 C.F.R. §§ 80.123 and 80.453(b) (secondary use of maritime frequencies for land-based communications); 47 C.F.R. § 90.259 (Industrial/Business use secondary to Automated Maritime and 218-219 MHz services), and former 47 C.F.R. §90.283 (provided for geographic sharing of VHF maritime public correspondence channels by land mobile services, adopted in *Amendment of the Commission's Rules Concerning Maritime Communications*, 1st Report and Order, 10 FCC Rcd. 8419 (1995) and removed at 3rd Report and Order, 13 FCC Rcd. 19853 (1998) when FCC moved from a site-based licensing of maritime channels to a geographic licensing approach).

DFS applauds the Commission's initiative to expand permitted, secondary use of the radio spectrum. There are many allocations and assignments which will accommodate properly designed and engineered interleaved assignments without degradation to the primary services. The key to effective maximization of the radio spectrum is proper engineering, site location and frequency selection. The low power, frequency discriminating concept suggested by the Commission and under development by DFS will open substantial new opportunities for spectrum sharing and utilization.

B. Licensed versus unlicensed operations.

DFS respectfully submits that both licensed and unlicensed operations have a legitimate and appropriate place in the Commission's regulatory regime. As a general proposition, secondary operations permitted in an allocation populated by licensed primary users should themselves be licensed. Unlicensed operations should be reserved for frequency bands principally allocated for unlicensed use.⁶ The policy considerations leading to this position are set forth below.

In the opinion of DFS, the feasibility of allowing unlicensed devices to operate in the TV broadcast spectrum and/or other bands inhabited by licensed users should be limited in the short-term and should be nonexistent in the long-term. This position is founded upon regulatory, economic and technical considerations.

⁶ As the Commission notes with regard to the 3650-3700 MHz band, as the Commission's allocation scheme evolves in the higher ranges of the radio spectrum or in bands re-allocated from Government or from uses which may not have developed as expected, there may be some grandfathered users. Such legacy operations should not foreclose the band from future unlicensed operation as the principal new utilization designation.

From a regulatory perspective, in a spectral environment where frequencies are occupied and utilized by both licensed and unlicensed users, the FCC would find it difficult if not impossible to identify unlicensed users engaging in operations that interfere with the signals of licensed, primary incumbent users. The inability of the FCC to determine the source of unlicensed interference necessarily would inhibit the agency's ability to undertake enforcement activity that would eliminate the interference source and preserve the rights of primary--licensed--users.

The value of spectrum at auction also may be significantly impacted by a decision to permit the unregulated (i.e., unlicensed) utilization of spectrum being considered for auction. Clearly, the value of spectrum to a prospective purchaser will be materially reduced if there exists a possibility that its property rights are or will become unenforceable against unlicensed users.

In the area of technical considerations, it reasonably may be concluded that in the proposed scenario, as the number of unlicensed users grows in a geographic area, the amount of "quiet time" available in the TV broadcast or other bands would be reduced correspondingly until those bands become saturated, producing constant levels of RF energy sufficient to inhibit communications, a condition commonly referred to as "cross correlation" (a/k/a "spectral gridlock"). Under a condition of spectral gridlock, the quality and effectiveness of unlicensed user communications would be significantly degraded.

Metropolitan areas are most susceptible to spectral gridlock, and will continue to be so under the proposal. In fact, this condition is known to exist today in cities such as Los Angeles, San Francisco and Tampa where spread spectrum users report chronic degradation in the performance of their systems.

While DFS applauds the aspirations and initiative of the FCC with regard to the development of new and innovative devices and services, DFS strongly believes that the economic benefits promised by increased spectral utilization may only be realized in an orderly spectral environment that promotes efficiency. Clearly, an efficient spectral environment requires regulatory oversight, and such oversight must of necessity take the form of user licensing and the enforcement of licensed user rights.

As an alternative to allowing the unlicensed utilization of the TV broadcast and other frequency bands, DFS recommends that the Commission pursue a dual strategy of: (1) licensing users in shared frequency bands by geographic region, and (2) promoting the development of innovative equipment and radio communication methodologies that may be employed by licensed secondary users on a non-interfering basis. These bands should be channelized, with one license per aggregate channel group covering a defined geographic area.

The licensing of users in shared channelized frequency bands by geographic region will serve as an incentive to users to transition to next generation technology by providing a reasonable base over which they can amortize the capital cost to implement the new technology. The economic savings that will inure to incumbent users by the adoption of this approach is both obvious and monetarily significant, and may be achieved without inhibiting the ability of the Commission to detect and identify interfering users, should interference be experienced. Further, the regulatory burden of issuing and coordinating new and renewal licenses will be significantly reduced.

With regard to the second of the recommended dual strategies, i.e., “promoting the development of innovative equipment and radio communication methodologies that may be employed by licensed secondary users on a non-interfering basis,” in response to the leadership and direction provided by the FCC the communications industry has undertaken the development of a new

generation of radio equipment and communications software. These new and emerging technologies and methodologies will produce radios that create less interference and are more tolerant of interference through sensory and adaptive capabilities. This will make possible the reduction/elimination of interference by licensed secondary users with licensed primary users on any and all shared frequency bands. Thus, the objective of mitigating spectral scarcity by allowing shared user access to “spectrum at locations and times when spectrum is not being used” may be achieved absent spectral gridlock and without sacrificing the benefits of regulatory control associated with user licensing.

C. Technical Requirements.

DFS respectfully submits that it would be inappropriate for the Commission to attempt to set technical standards at this juncture for secondary uses. Inherently, such a process must employ the lowest common denominator in terms of permissible operations. To do so would result in inhibiting technical innovation and the opportunity to realize full spectrum utilization. Rather, the Commission should adopt rules allowing for broad secondary use, and allow the applicant to describe how its system satisfies the non-interference requirement. An engineering review would become part of the application processing procedure by the Commission.

III. Conclusion

DFS endorses Chairman Powell’s call for a “forward looking approach” to interference protection that would require that transmitters not exceed the “interference level or temperature” of the spectral environment in which they are operating and that receivers tolerate a “minimum level of

interference.”⁷ Moreover, the Chairman’s conclusion that “by looking at the spectral environment . . . through the more focused measurement of interference temperature . . . [the Commission may] better distribute the responsibilities for spectrum use . . .”⁸ can be realized only by maintaining flexibility in secondary use assignments rather than through adoption of a generic one-size-fits-all technical standard. Finally, maintaining individual licensing of secondary users in frequency bands populated by licensed users will provide a level of confidence to the primary users that their spectrum utilization rights will be respected, maintain regulatory oversight, and limit any potential for abuse. The spectrum enforcement and spectrum management functions of the FCC are critical to the health, safety and welfare of Americans, and therefore may never be appropriately delegated outside of the Commission. The information highway will always require a regulatory traffic cop.

Respectfully Submitted,

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⁷ Address by Chairman Powell to the Silicon Flatirons Telecommunications Program at the University of Colorado (Oct. 30, 2002).

⁸ *Id.*