

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Improving Public Safety Communications in the 800 MHz Band	)	WT Docket No. 02-55
	)	
Consolidating the 800 and 900 MHz Industrial/Land Transportation and Business Pool Channels	)	
	)	
Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems	)	ET Docket No. 00-258
	)	
Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for use by the Mobile Satellite Service	)	ET Docket No. 95-18
	)	

**TROLL SYSTEMS COMMENTS IN SUPPORT OF THE JOINT PETITION FOR  
WAIVER OF SPRINT NEXTEL CORPORATION, the ASSOCIATION FOR  
MAXIMUM SERVICE TELEVISION, INC., the NATIONAL ASSOCIATION OF  
BROADCASTERS, and the SOCIETY OF BROADCAST ENGINEERS**

Troll Systems Corporation ("Troll") supports the Joint Petition for Waiver of Sprint Nextel Corporation, the Association for Maximum Service Television, Inc., the National Association of Broadcasters, and the Society of Broadcast Engineers (collectively, the "Petitioners") filed on September 4, 2007 in the above captioned proceeding.<sup>1</sup> The transition to the 2 GHz Broadcast Auxiliary Service ("BAS") band plan has encountered a number of unforeseen obstacles that have prevented the relocation from

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<sup>1</sup> Joint Petition for Waiver of Sprint Nextel Corporation, the Association for Maximum Service Television, Inc., the National Association of Broadcasters, and the Society of Broadcast Engineers, WT Docket No. 02-55 (September 4, 2007) ("Petition").

being completed within the thirty-one-and-a-half months originally prescribed by the Federal Communication Commission (“FCC” or “Commission”).<sup>2</sup> Troll urges the Commission to grant Petitioners’ request for an additional twenty-nine months to complete the relocation process. This additional time is necessary to ensure that all BAS licensees are transitioned to the new band while maintaining the operational integrity of their broadcast auxiliary systems.

**I. THE COMMISSION SHOULD GRANT THE PETITIONERS’ REQUESTED EXTENSION OF THE BAS RELOCATION DEADLINE**

A small business based in Valencia, California, Troll is the nation’s leading supplier of custom hardware and software needed to operate broadcast auxiliary service equipment and remotely operated devices, and one of only a handful of suppliers who offer equipment capable of meeting the needs of the United States broadcast industry. Troll’s master control systems create a link between broadcast command centers and remotely operated devices, such as antennas, microwave receivers, microwave transmitters, video switchers, decoders, camera systems, helicopters, and other remote site equipment. These control systems provide broadcast personnel with full command and control access to this remote camera and receive site equipment. With these systems, broadcasters enjoy a common interface for their BAS equipment that enables them to navigate from one device to the next and one receive site to the next without interruption, regardless of the kind of remote site equipment that has been deployed. Troll’s

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<sup>2</sup> See *Improving Public Safety Communications in the 800 MHz Band; Consolidating the 800 and 900 MHz Industrial/Land Transportation and Business Pool Channels*, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd 14969, ¶¶ 252, 352 (2004), as amended by Erratum (rel. Sept. 10, 2004), Second Erratum, 19 FCC Rcd 19651 (2004), and Public Notice, 19 FCC Rcd 21492 (2004) (requiring Sprint Nextel to relocate BAS licensees to the new band plan within 31.5 months).

“TouchStar” Controllers are the most widely used ENG control systems at remote ENG sites in the United States, with more than 2500 ground control systems now in operation, and Troll continues to introduce innovative new products for its control systems.

Based on its experience in this key industry niche and Troll’s estimated time to prepare what is – at bottom – custom-written software for sophisticated video equipment, Troll will require more time than was originally contemplated when the BAS relocation process commenced. Permitting an additional twenty-nine months to complete the BAS transition will permit Troll and other systems software engineering operations to integrate control-system functions into the hundreds of BAS systems that still must be addressed.

**A. BAS Relocation Is An Extremely Complex and Time Consuming Process**

BAS relocation requires the technically challenging and logistically complex transition of nearly 1,000 broadcast stations to new frequencies and facilities within the 2 GHz band. Troll’s participation in BAS relocation comes toward the end of the process, since the design of BAS master control software is one of the last steps in the configuration of a licensee’s new BAS system. As a general matter, Troll must wait for the parties to finalize their relocation plans before initiating the design of the control systems. Among other things, these parties must inventory equipment, determine facilities eligible for transition, obtain competitive bids from BAS equipment manufacturers, and negotiate detailed frequency relocation agreements. The complexity of these tasks has resulted in significant delays, and the BAS transition has already carried past the date originally prescribed by the Commission.

Like other elements of BAS relocation, the design and implementation of master control systems are technically challenging processes that can significantly extend the

timeline for relocating a BAS licensee's operations. Licensees' existing BAS facilities are varied and complex, comprised of extensive networks of fixed and portable interrelated transmitters, receivers, antennas, video switchers, and routers from a mix of equipment manufacturers. Within a given licensee's BAS system, facilities may differ significantly in terms of location, function, accessibility, and level of maintenance. Licensees' BAS systems are typically tailored to their market environment and particular newsgathering needs, and these facilities have often been assembled piece-by-piece over several decades. For each BAS licensee, Troll must design individualized software that enables the licensee's particular mix of BAS facilities to interoperate and to communicate with the broadcast command center. Because of the customized nature of these BAS systems, Troll must design customized master control systems and cannot "pre-stock" its software packages the way BAS hardware manufacturers can do with their equipment.

The software design process is further complicated by ongoing technological developments in the BAS marketplace. An industry sector long known for stable technology is being transformed by digitalization and increased demand for new equipment resulting from BAS relocation. Manufacturers are designing and producing more advanced BAS equipment, and as each new product enters the market, Troll must respond by updating or developing new master control software. For each new piece of equipment, Troll must design new software drivers that ensure that its master control systems are compatible with these new BAS equipment platforms. Troll's control software must also provide interoperability between new advanced digital equipment and legacy analog BAS facilities. Depending on the complexity of the new equipment, the design and testing of this new software will typically take up to sixty days to complete,

which can delay the stations' transition to digital, narrowed-in-place operations and, consequently, the final cut-over to the new BAS band plan. In some cases, Troll's design efforts demonstrate a need for minor modification of new BAS equipment, and this additional layer of manufacturer activity further extends the timeline for BAS relocation.

Given the rapid advances in BAS technology to date, it is not surprising that many broadcasters are choosing to modify their original purchase orders to take advantage of newly available BAS equipment. Modifications to purchase orders (or "change orders") also occur in instances where a BAS licensee has failed to purchase enough equipment to complete the relocation. When these "change orders" occur, Troll must take time to redesign that licensee's master control system software to account for the additional equipment. Given the numerous licensees involved in BAS relocation, these small modifications can have ripple effects that cause significant delays to the retuning process.

Troll often plays a role in the physical implementation of new BAS facilities, providing on-site assistance during the installation of relocated BAS systems. In Troll's experience, significant delay often results from factors that could not have been known until the installation process. While pre-assembly and equipment testing can eliminate some technical issues, certain interoperability and equipment compatibility problems will not become evident until the BAS installation team has reached the broadcaster's receive-site and remote unit location. For example, if a BAS equipment inventory for a licensee has failed to include certain BAS ancillary services and equipment discovered in the field, Troll will not have accounted for these services and facilities in its master control software, and the licensee's relocated BAS system will lack full functionality. In these instances, Troll must execute a redesign of its master control software, and the broadcast

licensee must often order new equipment. Depending on the complexity of the software design, this process can delay the licensee's relocation for several weeks.

The installation process has also uncovered unexpected issues relating to the supporting telecommunications infrastructure at the BAS receive site. Digital BAS operations require a broadband connection; if none has been deployed at a given location, deployment and testing of the new BAS system cannot proceed. In one instance, for example, Troll determined that the telecommunication infrastructure at a BAS receive site was not as robust as expected. As a result, Troll had to take additional time to work with the telecommunications carrier to ensure the availability of upgraded circuits that could support the new BAS system.

Vendor learning curves have also lengthened BAS licensees' installation timelines. In response to increased demand from licensees, a number of new companies are now offering BAS integration and installation services. Some of these new companies do not have full expertise on BAS systems and processes, and until they gain more experience their projects will likely proceed more slowly than expected. In addition, as new technology becomes available, there is inevitably some delay as even experienced installers and equipment integrators become familiar with these products. While the speed of installation can accelerate as vendors gain familiarity with this new equipment, the initial learning curve for this complex system integration can prolong the relocation process.

A number of other factors can delay the installation of BAS systems. BAS relocation work cannot be scheduled during certain periods in order to avoid disruption to broadcast licensees' electronic news gathering operations. Vendors, for instance, must

ensure that installation activity does not occur during sweeps periods, elections, or major news and national and local sporting events. Inclement weather conditions can also postpone BAS installation efforts. Finally, the installation process requires specialized labor, such as tower climbers, that is in short supply. This labor shortfall slows the pace of installation.

**B. Despite Troll's Concerted Effort to Expedite BAS Relocation, At Least Twenty-Nine More Months Are Necessary to Complete This Process**

In response to the challenges described above, Troll has taken a number of steps in an effort to expedite BAS relocation. Sprint Nextel contacted Troll at the outset of the transition and urged the company to increase its staff, facilities, and systems to prepare for the hard work of BAS relocation. In response, Troll anticipated the increased demand for BAS equipment and has significantly expanded its hardware stock, workforce, and overflow capacity. Among other things, Troll responded to the need for additional equipment storage space by expanding its office and production area by more than twenty thousand square feet. Troll has also more than *quadrupled* the number of its employees from thirteen to fifty-four, and anticipates hiring more people before the end of the year. Troll even hired a new Chief Operating Officer, John E. Alsop. Mr. Alsop, who has extensive broadcast, aerospace, and international defense manufacturing and product development experience, previously directed business development, program management, and product direction for Raytheon's Home Land Security Product Line and brings a new level of expertise to Troll.

Unfortunately, the hiring process – both at the executive and entry level – has absorbed significant company time and resources, which might otherwise be employed developing control systems and related products. Moreover, the pool of skilled labor in

this specialized industry is limited, and the company must make a substantial investment in the training of new employees. As of today, Troll continues to have several vacant job openings for a variety of positions, including an engineering manager, a mechanical designer, an information technology manager, a program manager, a customer service technician, a systems engineer, junior systems engineer, and a systems integrator.

Troll supports the Petitioners' request for a substantial extension of the BAS relocation deadline. The complexities of the process have already taken BAS relocation beyond the date originally prescribed by the Commission. As described above, given the highly customized nature of Troll software, Troll will require additional time to develop, test, and incorporate control systems into the newly deployed BAS facilities. The Commission's grant of an additional twenty-nine months for the completion of BAS relocation will further the public interest by ensuring that broadcast licensees can transition to the new 2 GHz band plan without disrupting their operations and jeopardizing service to their communities.

## **II. CONCLUSION**

For the reasons described above, the Commission should expeditiously grant the Petitioners' request for a twenty-nine month extension of the BAS relocation deadline.

Respectfully submitted,

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/s/ John Alsop

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