

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)
)
Amendment of the Commission's Rules with) GN Docket No. 12-354
Regard to Commercial Operations in the)
3550-3650 MHz Band)

**COMMENTS OF THE
NATIONAL ASSOCIATION OF BROADCASTERS**

The National Association of Broadcasters (“NAB”)¹ submits these comments on the above-captioned Notice of Proposed Rulemaking.² The Commission proposes to create a new Citizens Broadband Service in the 3550-3650 MHz band that will utilize small cell and spectrum sharing technologies. Notice at ¶ 1. The Notice also offers a supplemental proposal to potentially include the 3650-3700 MHz band in the new regulatory regime. *Id.* at ¶¶ 77-82. The Notice seeks comment on the licensing and related aspects of the new broadband service, on which NAB takes no position. We do, however, have significant concerns regarding interference from the proposed service to important existing C-band satellite services.

Broadcast networks and others use C-band satellite services to distribute programming to thousands of earth station satellite receivers in the United States that operate in the 3700-4200 MHz band. This spectrum is used intensively by

¹ NAB is a nonprofit trade association that advocates on behalf of local radio and television stations and also broadcast networks before Congress, the Federal Communications Commission and other federal agencies, and the courts.

² *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Notice of Proposed Rulemaking, FCC 12-248, GN Docket No. 12-354 (rel. Dec. 12, 2002) (“Notice”).

broadcasters, syndicators, cable networks and others to deliver most pre-recorded news, sports, public affairs and entertainment programming to local stations, and in turn, to audiences throughout the United States.³ The C-band is also used to distribute certain widely-viewed, pre-scheduled live programming, as shown by the C-band trucks located on-site at the Super Bowl and the Grammy Awards.

The importance of such programming and information to American audiences is obvious. From popular comedies, dramas and sports, to syndicated game shows and talk shows, and news and public affairs programming, Americans rely on broadcasters and other C-band users to provide programming with a crisp, clear, uninterrupted signal. Such programming is the backbone of the television industry.

As demonstrated in the attached statement of Sidney M. Skjei, P.E., the Notice's proposed new Citizens Broadband Service would increase the risk of emissions causing harmful interference to conventional satellite services in the 3700-4200 MHz band. Given the thousands of earth station satellite receivers in use, and the nature of the proposed broadband service, Mr. Skjei concludes that the likelihood of interference is "significant." Statement at 2. Such interference would degrade the quality of services and programming that television stations deliver to audiences across the country.

As discussed in more detail in his statement, Mr. Skjei explains that interference is so likely because many conventional C-band earth stations, operating at 3700 MHz and above, can "hear" the signals transmitted by operations above 3400 MHz, including the proposed Citizens Broadband Service to operate in the 3550-3650 MHz band and in the adjacent 3650-3700 MHz band. Statement at 1-2. He also explains the difficulty of

³ Letter from Coalition of C-Band Constituents to Ms. Marlene Dortch, Secretary, FCC, ET Docket Nos. 98-153 and 02-380 (dated Dec. 2, 2004), at 1.

predicting and protecting against this interference, due to the lack of geographic boundaries and database registration of operations both below and above 3700 MHz. Indeed, Mr. Skjei describes this interference as “random” because neither the location of the interferor (*i.e.*, the Citizens Broadband Service device) nor the interferee (*i.e.*, the C-band earth station receiver) “can be adequately predicted.” *Id.* at 2, 4.

It is therefore important for the Commission to take steps in this proceeding to ensure that incumbent satellite services in the C-band are not harmed by emissions associated with the proposed Citizens Broadband Service. American audiences place a high value on the news and entertainment programming distributed through C-band services, and their reception and enjoyment of these services should not be degraded.

As discussed herein, NAB takes no position on the licensing and related aspects of the newly proposed Citizens Broadband Service. Given the significant interference concerns explained by Mr. Skjei, however, if the Commission ultimately determines to establish this new service, then specific additional protections will be needed to safeguard incumbent C-band services from any harmful interference. Moreover, in light of these complex and difficult to resolve interference issues, the Commission should

refrain from expanding its proposal include the adjacent 3650-3700 MHz band.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Jane E. Mago".

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Date: February 20, 2013

ENGINEERING STATEMENT OF SKJEI TELECOM, INC.

At the request of the National Association of Broadcasters (NAB) the undersigned has prepared this Engineering Statement regarding the Commission's Notice of Proposed Rulemaking in GN Docket No. 12-354.¹ Skjei Telecom has more than 30 years of experience in engineering, operating and developing a wide range of hardware and software for satellite communications systems and services. We are highly knowledgeable in all major satellite communications operational areas: global, U.S. domestic and military.

In the Notice, the Commission proposes to create a new Citizens Broadband Service (CBS) consisting of small cell wireless communications services that would share spectrum with other services in the 3550-3650 MHz band. We believe that the Commission's supplemental proposal to integrate the 3650-3700 MHz band within the proposed Citizens Broadband Service, Notice at ¶ 77, poses a risk of causing interference to existing C-band satellite down-links operating in the adjacent 3700-4200 MHz band. Broadcasters and others use this latter band for the distribution of most programming to thousands of earth station receivers at television and radio facilities throughout the United States, and in turn, to American audiences.

The potential for CBS interference into C-band receive earth stations used by broadcasters is significant for a number of reasons, the most serious of which are:

- a) For many years, the majority of earth station satellite receivers used by broadcasters to receive C-band satellite delivered programming have been equipped with low noise block converters (LNBS) whose pass band extends down to 3.4 GHz (3400 MHz). As a result, many receivers can "hear" the signals transmitted by services operating above 3400 MHz, including the proposed Citizens Broadband Services. Indeed, for receivers with such LNBS, the interference caused by CBS operations would be in-band.

¹ *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Notice of Proposed Rulemaking, FCC 12-248, GN Docket No. 12-354 (*rel. Dec. 12, 2002*) (Notice).

- b) On a geographical basis, the interference caused by CBS operations would be random because the location of both the interferors (*i.e.*, CBS devices) and the location of the C-band receive earth stations are not adequately documented or amenable to database derived interference calculation.

CBS Emissions Into C-Band Earth Stations

Under the current rules,² the out-of-band emissions (OOBE) suppression formula for operations in the 3650-3700 MHz band into the 3.7-4.2 fixed satellite services (FSS) receive band is governed by the equation $43+10\text{Log}(P)$.³ Under certain deployments of these proposed CBS systems, these OOBE levels would not provide sufficient suppression of emissions to preclude interference to C-band downlink operations in the adjacent 3700-4200 MHz band. Even one isolated CBS device transmitting near a C-band receiver could cause interference. Moreover, the Notice contemplates situations where multiple CBS users could be located in the same area, Notice at ¶ 4, which would multiply the risk of interference to broadcast services in the adjacent band. This is especially true in those scenarios where the CBS emitter is located within 1 kilometer of an earth station receiver. Given the thousands of such receivers located throughout the United States, and unlimited nature of CBS operations, the likelihood of such interference is significant.

It should be noted that improved, well-filtered LNBS, even with the addition of band-pass filters, will not mitigate in-band interference in those cases where the CBS transmitter meets $43+10\text{Log}(P)$ OOBE suppression but is within close proximity to the earth station.

Additionally, in many cases the interference from CBS devices will be in the pass band of the earth station LNB, not out-of-band, so the $43+10\text{Log}(P)$ emission requirement would not apply and the signal level observed by the C-band receiver from the CBS transmitter would be much higher. This is because of the prolific use of Extended Band LNBS whose pass band includes the

² 47 C.F.R. §90.1323(a).

³ Where P is transmit power of the interfering device. For example, when P is 1 watt/MHz or 0 dBW/MHz, the power outside of the device's operating band must be reduced by -43 dBW/MHz.

frequencies in question. These LNBS have been in use for years because of the use of the extended bands worldwide and the mass producing of LNBS for the global satellite market, not just the U.S. market. In many cases, vendors only manufacture and sell these extended C-band LNBS, not LNBS for the U.S. market of 3.7 to 4.2 GHz. These extended band LNBS would be susceptible to signal suppression when CBS transmitters, in close proximity to the earth station, saturate the LNB causing signal suppression of wanted carriers (clipping), an increase in-band noise (reduction in carrier C/N), and phase non-linearities.

While filters can be used to improve performance in the presence of OOB emissions, the impact of the filtering at the input of the LNA/LNB will impact the overall receive performance of the terminal, degrading the system G/T by a potentially significant amount.⁴ In some cases, these filters require the earth station operator to replace the antenna with a larger and more costly antenna in order to maintain the same G/T and performance.

Coordination Zones

We agree with the Commission's proposal to continue to protect incumbent extended C-band FSS and those new earth stations located within 10 miles from grandfathered earth stations. In addition, we recommend that the protection criteria remain as before: 150 km exclusion zones with a requirement to coordinate with FSS earth station licensees in those cases where operation within the exclusion zone is required.⁵ We also submit that, because the exact nature of the signals emitted by CBS fixed and mobile transmitters is unknown at this time (*e.g.*, power, OOB), additional studies regarding the interference potential of these devices may be necessary before the Commission considers relaxing the 150 km exclusion zone.

⁴ Gain divided by System Noise Temperature – the figure of merit of the earth station which determines performance to a significant degree.

⁵ Notice at ¶ 28.

Spectrum Sensing

The Notice also asks if spectrum sensing would be warranted. Notice at ¶ 148. In the case of protecting FSS receive-only earth stations, sensing would not be applicable because most receive earth stations do not transmit any signals. Thus, there are no signals for the CBS device to sense.

It should also be pointed out that the Commission does not require the licensing of C-band receive earth stations; as a result, hundreds if not thousands of such stations, even those with many years in service, are neither licensed nor documented in any database. As a result, the location of many such earth station receivers is known only to the earth station owner.

The Notice suggests that the location of the interfering CBS users will similarly be unavailable, as they will not be subject to documentation in a database, nor at a fixed location in all cases. This will result in a completely random interference situation, where neither the location of the interferor/CBS device or the interferee/C-band earth station receiver can be adequately predicted.

Summary

We believe there is a real potential for interference into thousands of licensed and unlicensed 3.7-4.2 GHz FSS receive only earth stations. This is due in part to the many LNBs already in operation which would be susceptible to interference from CBS operations in the extended C-band; the geographically random nature of the interference due to the fact that the locations of neither CBS devices or C-band receive earth stations are known specifically; and the inadequate OOB protection levels provided by the current rules for earth stations operating at C-band. The high costs to preclude interference and to rectify those cases of interference that may arise are also of concern.

CERTIFICATE

I, Sidney M. Skjei, certify that I am the technically qualified person responsible for the preparation of the technical discussion contained in the Communications Broadband Services NPRM Comments filed by the NAB, that I am familiar with Part 25 of the Commission's Rules (47 C.F.R. Part 25), and that I have either prepared or reviewed the technical information submitted in these comments and found it to be accurate to the best of my knowledge and belief.

By: /s/ Sidney M. Skjei
Sidney M. Skjei, P.E.
Skjei Telecom, Inc.

Dated: February 20, 2013