

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Flexibility for Delivery)	IB Docket No. 01-185
Of Communications By)	
Mobile Satellite Service Providers)	
In the 2 GHz Band, the L-Band, and the)	
1.6/2.4 GHz Band)	
)	
Amendment of Section 2.106 of the)	ET Docket No. 95-18
Commission's Rules to Allocate Spectrum)	
At 2 GHz for Use by the Mobile Satellite)	
Service)	

**COMMENTS OF THE WIRELESS COMMUNICATIONS DIVISION OF THE
TELECOMMUNICATIONS INDUSTRY ASSOCIATION**

In response to the *MSS Flex NPRM* released by the Commission August 17, 2001,¹ the Wireless Communications Division (“WCD”) of the Telecommunications Industry Association (“TIA”) hereby submits its comments in the above-captioned proceeding.² TIA’s WCD restricts its comments to the technical characteristics of the use of the 2 GHz Mobile Satellite Service (“MSS”) band for terrestrial purposes. As is demonstrated herein, the WCD believes that any terrestrial use of 2 GHz MSS spectrum will require the segmentation of the band to separate it from satellite use. The WCD asserts that the 2 GHz MSS proposal is not a new or novel spectrum allocation, rather, it simply reflects the current state of technology that requires spectrum to be bifurcated between satellite and mobile terrestrial uses. In addition, the WCD

¹ See *Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Band; Amendment of Section 2.106 of the Commission’s Rules to Allocate Spectrum at 2 GHz for Use by the Mobile Satellite Service*, IB Docket No. 01-185, ET Docket No. 95-18, *Notice of Proposed Rulemaking*, FCC 01-225 (rel. Aug. 17, 2001) (“*MSS Flex NPRM*”).

² TIA is the leading trade association representing the communications and information technology industry, with over 1,000 member companies that manufacture or supply the products and services used in global communications networks. On occasion, a TIA division will file in a regulatory proceeding representing the views of only the members of that division. These comments are from TIA’s Wireless Communications Division.

urges the Commission to require 2 GHz MSS proponents to provide particular technical information surrounding the ancillary terrestrial network, so that interference effects can be completely understood by the other affected licensees of the 2 GHz band.

I. Satellite and Mobile Terrestrial Operations Must Be Spectrally Separated.

Among their numerous lines of business, TIA member companies design, produce and deploy terrestrial wireless network and terminal equipment. As such, TIA's WCD is well positioned to provide technical information and guidance to the Commission on the compatibility of satellite and terrestrial networks.

In its March 8, 2001 filing with the Commission, New ICO Global Communications (Holdings) Ltd. ("New ICO") indicated that MSS providers would require the deployment of ancillary terrestrial service to complement their satellite service.³ New ICO argued that without this added flexibility, the MSS would be in dire jeopardy. However, throughout the technical spectrum sharing appendix of this filing, it is clear that New ICO clearly intends to simply segregate its terrestrial and satellite components of its operations to provide terrestrial services to urban areas and satellite service to rural areas.⁴ Contrary to its statements, this simply replicates the dual-mode handset model deployed by Iridium and Globalstar and proposed by Celsat.

A. New ICO "Sharing" Modes Require Band Segmentation, By Its Own Representations.

New ICO discusses its proposal for ancillary terrestrial service by asserting that there are four potential areas of intra-system spectrum sharing: Forward Band, Reverse Band, Downlink Duplex, and Uplink Duplex. Significantly, in each of these contexts, mobile units must be dual

³ See *Ex Parte* Filing of New ICO, filed March 8, 2001 at 2.

⁴ See e.g., *Ex Parte Filing* of New ICO, filed March 8, 2001, Appendix B at 3, 4, 6, and 7.

mode and non-overlapping spectrum must be assigned to the satellite and terrestrial components of the network.⁵ Further, New ICO has shown in this same technical appendix that its satellite network will deploy an FDMA/TDMA access technique for its uplinks and downlinks.⁶ It also presents a third generation CDMA system as a representative system for its ancillary terrestrial network.⁷

The WCD strongly believes that, as New ICO has demonstrated in its technical showing, segmentation of terrestrial and satellite operations is necessary for the mitigation of harmful intra-system interference.⁸ In each of the “sharing” modes proposed by New ICO, the terrestrial and satellite channels are assigned “...non-overlapping spectrum...”⁹ New ICO avers that such band segmentation is only necessary as an initial step, but as is discussed in more detail below, the WCD believes band segmentation is not only necessary initially but also must be continued for co-channel interference between mobile terrestrial and satellite systems to be avoided.

Additionally, New ICO describes its mobile units to have dual-mode capabilities.¹⁰ In other words, the handsets to be utilized for a hybrid satellite/mobile terrestrial network must have the capability to distinguish between the satellite and the mobile terrestrial systems. In order to accomplish this goal, the operations of an MSS provider seeking this capability must segment its spectrum channels to differentiate between the satellite and the terrestrial operations. Without spectral separation, a handset will be overwhelmed by the power of the mobile terrestrial base stations that operate co-channel to the satellite network and will be unable to properly communicate.

⁵ See *Ex Parte Filing* of New ICO, filed March 8, 2001, Appendix B at 3, 4, 6, and 7.

⁶ *Id.* at 10.

⁷ *Id.*

⁸ See e.g., *Ex Parte Filing* of New ICO, filed March 8, 2001, Appendix B at 3, 4, 6, and 7.

⁹ *Id.*

¹⁰ *Id.*

This co-channel interference situation is particularly true of the network proposed by New ICO where the satellite network will utilize an FDMA/TDMA access technology and the mobile terrestrial operations uses a CDMA access capability. The CDMA and FDMA/TDMA access technologies are incompatible as the nature of each technology takes advantage of different physical characteristics for successful operations. FDMA/TDMA is enabled by the reuse of frequency or time slots within a spectrum band while CDMA uses low power spread spectrum technology and embedded codes for voice and data transmissions. The fundamental inconsistencies of these access technologies require a separation in spectrum and power for their use. The WCD notes that no MSS proponent has provided detailed analysis that demonstrates that co-channel FDMA/TDMA and CDMA networks can coexist.

B. The Power Differences Between Terrestrial Base Stations and Satellite Downlinks Dictate Spectral Separation.

The WCD can only comment on the proposed operations of New ICO, as no other 2 GHz MSS licensee has provided any technical details about an ancillary terrestrial service that it might deploy. As such, the WCD restricts its comments to the FDMA/TDMA satellite network proposed by New ICO, as well as the use of a third generation CDMA network for the ancillary terrestrial network.

New ICO states that its mobile units minimum receiver G/T is $-23.8 \text{ dB}/^\circ\text{K}$.¹¹ In addition, New ICO asserts that an 18 dB carrier to interferer ratio must be maintained to guarantee interference-free operations.¹² In its technical showing, New ICO estimates its peak terrestrial base station EIRP to be 27 dBW in a 1.1 MHz bandwidth, which is equivalent to a power density

¹¹ See *Ex Parte Filing* of New ICO, filed March 8, 2001, Appendix B at 10.

¹² *Id.*

level of -33.4 dBW/Hz.¹³ In contrast, the satellite downlink power flux density at the Earth's surface is -169.7 dBW/Hz/m².¹⁴ Assuming unobstructed free space propagation, a separation distance of over 10,000 km would be required for there to be an 18 dB carrier to interferer ratio between the desired satellite link and the ancillary terrestrial link. However, with the terrestrial system being limited by the radio horizon, a 40 meter high base station and a 2 meter high mobile unit would *only* need to be separated by 32 kilometers to prevent co-channel, harmful interference. Of course, if the terrestrial base station were located higher than 40 meters (a fairly common occurrence) this preclusion zone would be even more vast than 32 kilometers.

New ICO claims that a 32 kilometer preclusion zone would not be an obstacle to the implementation of a terrestrial network. However, this interference zone would in effect be a circle with a radius of 32 kilometers. From simple geometry, the area of a 32 kilometer circle can be calculated to be $\pi(32)^2$ or approximately 3214 square kilometers. To put this into perspective, 3214 square kilometers would cover an area greater than the area within the Capital Beltway in Washington, DC, and would include much of the suburban area in Virginia and Maryland even outside the Beltway. Certainly a co-channel network with this size of an interference zone is impractical to deploy. The only solution to this intractable problem is to spectrally segment the MSS band between satellite and terrestrial networks to remove this exclusion zone around terrestrial base stations.

C. New ICO's Proposal Is Simply A Different Configuration Of Similar Systems Already Deployed.

The WCD believes that the hybrid mobile terrestrial/satellite network proposed by New ICO is actually a replication of similar technology path choices made by Iridium and GlobalStar,

¹³ *Id.* at 18.

and proposed by Celsat. Each of these entities have (or have planned to deploy) dual-mode handsets that can operate in the presence of a satellite signal or automatically hand off communications to a terrestrial network where the satellite signal is insufficient. The primary difference is that these companies have partnered with terrestrial suppliers of communications services (i.e., PCS or Cellular) to deploy their seamless communications networks. From the technical showing provided by New ICO, the segmentation of the MSS band required for the New ICO system does not differ technologically from these other parties. The WCD asserts that New ICO has not demonstrated why such partnerships will not suffice for 2 GHz MSS licensees' purposes. In fact, Celsat, another 2 GHz MSS licensee, continues to voice its support for such an implementation plan.¹⁵ The WCD respectfully submits that the provision of additional ancillary services within the MSS as proposed by New ICO does not present a novel use of the electromagnetic spectrum. New ICO's proposal only seeks to replace its satellite network with a mobile terrestrial operation.

II. Technical Information Is Solely Lacking From The Commission Record On Terrestrial System Parameters.

The WCD notes that of the eight licensees in the MSS band, only New ICO has presented technical data surrounding the use of an ancillary terrestrial system. However, this limited data is insufficient for affected parties to calculate intra-system interference potential within the MSS band. Moreover, affected adjacent band licensees, including Personal Communications Service ("PCS") providers, Broadcast electronic news gathering ("ENG"), Advanced Wireless Systems and Federal Government users, cannot accurately determine the interference effects of a terrestrial network within the MSS band without specific technical information about the system

¹⁴ *Id.*

to be deployed.

New ICO suggests that a third generation CDMA system be used as a representative ancillary terrestrial component. However, there has been no commitment by New ICO, nor any other MSS proponent, to a particular technology path. More critically, no extensive modeling or technical showings have been provided to the Commission to demonstrate that other MSS proponents who may not wish to deploy a terrestrial component will be protected from harmful interference. Nor has there been convincing technical interference showings, based upon the actual operations of PCS, ENG, Advanced Wireless, or Federal Government systems. Such simulations or interference showings would need to demonstrate that all these licensed systems will be protected, as they are from satellite operations in the MSS band.

Moreover, emission mask limits and power restrictions that must be in place to protect adjacent band operations have not been proposed or developed by the MSS proponents or the Commission. Terrestrial mobile operators are consistently required to limit the power of their base stations as well as to limit the out-of-band emissions of their mobile and base stations.¹⁶ While New ICO has made a rudimentary effort to demonstrate that its out-of-band emissions will be limited, there has been no proposal made by the Commission of an effective radiated power or emission mask limit with which terrestrial systems must comply. The WCD strongly believes that such interference protection guidelines must be presented and studied well prior to any Commission decision on the feasibility of ancillary services within the 2 GHz MSS band.

Furthermore, it is completely unclear in the New ICO technical exhibit where the non-overlapping spectrum would be drawn from for the combined network. The WCD can only assume that such spectrum would be found by conscious segmentation of the MSS licensees

¹⁵ See *Ex Parte Filing* of Celsat America, Inc. (“Celsat”), filed July 13, 2001.

¹⁶ See *e.g.*, § 22.359, § 22.913, § 22.917, § 24.132, § 24.133, § 24.232, § 24.238.

licensed spectrum. In fact, without the provision of a band plan detailing the spectrum used for its ancillary network, the interference effects within the MSS band, as well as the effects upon licensed, adjacent band users cannot be determined.

The WCD encourages the Commission to request this needed technical information and permit interested parties a period of time to comment on these specific operating requirements prior to the authorization of any additional ancillary services in the MSS band.

