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July 19, 2002

Secretary
Federal Communications Commission
Washington DC 20554

Re: ET Docket No. 95-18, Mobile Satellite Services

Gentlemen:

The attached document contains answers to several questions that arose after the June 18 meeting with Anthony Finizio, President of Microwave Radio Communications.

Sincerely,

Jeffrey Krauss

Microwave Radio Communications Response to FCC Questions Regarding Tony Finizio's June 18 Presentation on 2 GHz BAS Issues

Submitted July 19, 2002

On chart 24, there are three columns shown. Please explain what each column represents.

Slide 24 shows a potential phase II channel plan that could be used to minimize oscillator change outs. Column 1 indicates the channel number, column 2 indicates the negative offset center frequency, column 3 indicates the channel center frequency, column 4 indicates the positive offset frequency, column 5 indicates the allotted channel bandwidth.

Please clarify how channel offsets are used today in the 2 GHz band, with analog 17 MHz channels. How will channel offsets be used in the future with digital channels? Is there a difference between offsets vs. split channels in terms of occupied bandwidths?

Currently, with analog channels of 17 MHz, a broadcaster might be assigned channel 2 (say) by the local coordinating group, and would normally use the center frequency of channel 2 with a 17 MHz bandwidth. However, if channel 1 happens to be in use nearby, this might result in interference into the broadcaster's channel 2 receiver. If it happens that channel 3 is not being used nearby, then the interference can be decreased or eliminated if the channel 2 broadcaster moves his center frequency up by 4.25 MHz so that there is an incursion into channel 3 by 4.25 MHz. If this results in interference into the broadcaster assigned to channel 3, then the offset would not be used. Whether or not interference occurs into channel 3 depends on the polarization, location and orientation of the channel 3 receive antenna relative to the offset channel 2 transmitter.

In the future, channel offsets will probably continue to be used by broadcasters in this same manner. The frequency offset would be one-quarter of the channel bandwidth. The occupied bandwidth of the signal would be the same whether the center frequency of the channel is used, or an offset frequency is used. So a 12 MHz channel would use a 3 MHz offset. Following this plan, for 14.5 MHz channels the offset would be 3.625 MHz, but that should be "rounded" to 3.5 MHz in order to use oscillators with a 250 kHz step size.

In addition to frequency offsets, with digital there is a possibility of channel splitting under some circumstances. In principle, the occupied bandwidth of a digital video signal might be as small as 6 MHz. Splitting a 12 MHz channel into two 6 MHz channels might work for fixed point-to-point links with careful frequency coordination, but we don't think this will work very well in an ENG environment, which is characterized by serious multipath challenges, transmission while in motion, and other propagation impairments. Channel splitting may be more practical with the Phase 1 bandwidths of 14.5 MHz.

In the materials you provided, you made reference to 10 channels or 30 channels with offsets--please clarify what this meant.

At 2 GHz today, there are seven channels at 1990-2110 MHz and two at 2450-2483.5 MHz. There was formerly a tenth channel, 2483.5-2500 MHz. The spec sheet indicates that the radio may be tuned to any of these ten channel frequencies, and may also be tuned to the twenty related offset frequencies, which are ±4.25 MHz away from the center frequencies, for a total of thirty.

Do you have a specification sheet for the Strata with specifications that are comparable in detail to the CodeRunner spec sheet?

We will have an updated Strata spec sheet sent to you when it is revised

Slides 6 and 7 talk about oscillator accuracy but slides 18 and 21 talk about oscillator step size. Are they the same? If not, please clarify the difference.

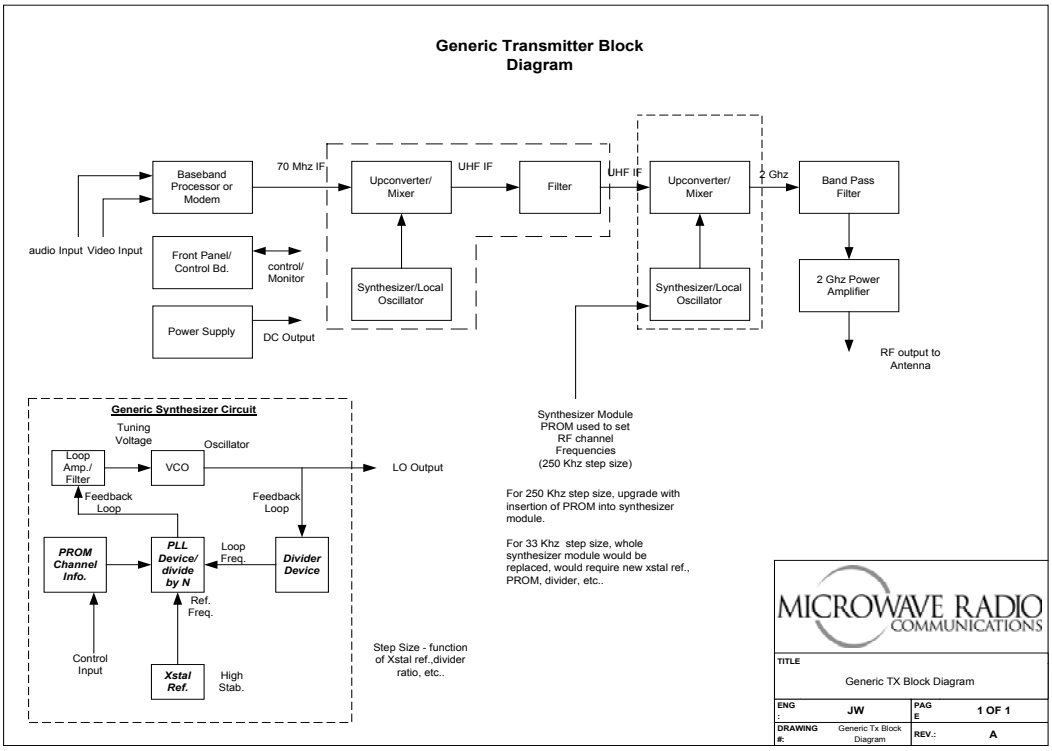
The terms "oscillator step size" and "oscillator accuracy" mean the same thing.

What is the mathematical link between oscillator step size and channel center frequency? Does the center frequency have to be an exact multiple of the step size?

Legacy radios have a 250 KHz synthesizer step size, and use a programmable divide by (multiply by) N device where N is a whole number multiple of the step size which generates the channel center frequency and/or offset frequency. Going forward it would be easier if a 250 KHz step size could be maintained, and if the center frequencies were exact multiples of the step size. It would mean fewer parts to change in legacy designs.

Can you provide a block diagram that shows how the oscillator fits into a transmitter/receiver and what role it plays in affecting the radio's ability to conform to various channel plans. What is the hardware design impact (how would the block diagram change) of a channel plan where the channel center frequency is not an exact multiple of a small frequency, but is offset by a constant amount? (for example, offset by 33 kHz from being a multiple of 250 kHz).

To support a new step size other than 250 KHz for legacy radios would require a new synthesizer module which would incorporate changes to the crystal reference, PROM and divider ratio circuits. The overall block diagram would not change but the internal LO circuits would have to be changed. (refer to generic block diagram).



Does it make a difference to manufacturers between a channel plan of seven equal size channels vs. six equal size plus one slightly larger or smaller?

No, it makes no difference.

You made a reference to the phase 2 bandwidth of 12.1 MHz resulting in reduced quality. Was this relative to an analog signal vs. a digital signal? Was this relative to an HDTV signal vs. a SDTV signal? Please clarify

This is relative to an analog signal, when going from an existing 17 MHz bandwidth to a 12.1 MHz bandwidth. The degradations manifest themselves in reductions in S/N, video/audio performance and C/I performance. These degradations are well documented in independent lab tests conducted by the Communications Research Centre Canada Broadcast Technology in September 1999. MRC has also conducted similar adjacent channel performance measurements tests showing the degradation in the C/I relationship.

In slide 18 there is reference to 3.5 MHz offsets but in slide 24 there is reference to 3.0 MHz offsets. Can you clarify the difference? Does one refer to Phase 1 and the other to Phase 2

Slide 18 refers to a Phase I implementation (14 MHz channels) using +/- 3.5 MHz offsets while slide 24 refers to a Phase II implementation (12 MHz channels) using +/- 3.0 MHz offsets.