

**From:** Johnny Stigler jstigler@swbell.net  
**Subject:** RE: TVWS Massive MIMO  
**Date:** May 25, 2020 at 1:47 PM  
**To:** Camp, Joseph camp@lyle.smu.edu



[KLEG - Silent STA exhibit - 5-24-2020.docx](#) Applicant General Information Silent STA exhibit 5-24-2020  
This is RF Ch 28 554-560 a good spot for your project

Johnny Stigler  
214-236-0222

---

**From:** Camp, Joseph [mailto:camp@lyle.smu.edu]  
**Sent:** Friday, May 22, 2020 4:34 PM  
**To:** jstigler@swbell.net  
**Subject:** Re: TVWS Massive MIMO

Hi Mr. Stigler,

As discussed on the phone, attached is the current FCC Experimental License that we have. You mentioned that we would need a letter confirming that we had discussed the channels and a potential path forward. If you could provide that at your earliest convenience, that would be great.

Thank you!  
-Joe

--  
Joseph Camp  
Associate Professor, SMU  
Lyle School of Engineering (ECE)  
<http://lyle.smu.edu/~camp>

On May 22, 2020, at 3:15 PM, Camp, Joseph <[camp@lyle.smu.edu](mailto:camp@lyle.smu.edu)> wrote:

Hi Mr. Stigler,

I talked to Skylark Wireless (<https://www.skylarkwireless.com>) and they gave me a link model to see what ERP their hardware would output. With 16 radios operating at 26 dBm, the maximum EIRP would be 50 dBm or 100 W. Please see the calculation below:

Massive MIMO Link Budget	Params	Down	Up	Notes
Per Radio Power	26 dBm			Assumes PAPR included
Number of Radios	16			
Number of Spatial Streams	16			
Polarization	2			Polarizations Beamform in Isolation, but splits number of spatial streams across them
Carrier Frequency	500 MHz			
Distance	5 miles			
Freespace Pathloss	104.48 dB			
Antenna Gain		15 dB	5 dB	Includes any cable/connector loss
<b>Max Achievable EIRP</b>		<b>50 dBm</b>	<b>31 dBm</b>	<b>Per spatial stream in downlink</b>
EIRP Limit (Regulatory)		100 dBm	100 dBm	Set this very high if there is no regulatory limit (for channel estimates on uplink -- though using narrowband channel estimates avoids PAPR loss and would improve this)
Receive Power		-49 dBm	-58.48 dBm	(after array combining on uplink)
			-49.45 dBm	

Would this be something we could do on channel 15, 17, 26, or 28? We only need one channel.

-Joe

--

Joseph Camp  
Associate Professor, SMU  
Lyle School of Engineering (ECE)  
<http://lyle.smu.edu/~camp>