Applying the Concept of Earth-Moon-Earth (EME)

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> This article was motivated by my fellow HAMs from the satellite group. Based on my success with application of EME on 2 metre to SARTS Repeater without line of sight, I hope this can help those in the hobby to explore the concept of EME.

Earth-Moon-Earth communication (EME), also known as **moon bounce**, is a radio communications technique which relies on the propagation of radio waves from an <u>Earth</u>-based transmitter directed via reflection from the surface of the <u>Moon</u> back to an Earth-based receiver

"facing Southwest, surrounded by tall buildings"

Challenge of QTH

I am located at the South Eastern Coast of Singapore, an apartment dweller with low elevation of 25 meters facing Southwest.



Approximately 12km to the repeater. Small balcony with an opening of just slightly over 100 degrees and surrounded by tall buildings makes it difficult for me to reach SARTS repeater located at Dover.

For many months when I first started as a new HAM, all I could hear was noise from my HT. Each time I pushed the PTT, I couldn't trigger the repeater. And even if I could trigger the repeater, I couldn't hold TX. It was frustrating, I fully understand if you are facing similar challenges.



Using a Diamond AS1430 beam antenna, I pointed it toward SARTS repeater as much as possible. Noticed the

building walls on the right would affect the radiation pattern, that would likely have negative impact to my transmission.

Our veteran HAMs would often advise us to be creative in our thoughts and design of antenna type and locations. With that in mind, I decided to try out a higher gain vertical antenna.

On the same spot, I erected a Diamond NR22LH vertical. Test it out with complete failure!

Now the NR22LH became one of my best antenna in the field of POTA.



Earth-Moon-Earth (EME)

9V1YP: "Poke the sky" In the midst of my frustration, I decided to explore working on satellite. That was when 9V1KB introduced me to a group of satellite HAM led by 9V1YP.

We began hitting satellite such as LAPAN IO-86 and ISS. By hitting I meant I was very successful with APRS. Through IO-86 and ISS, my APRS packets hit the Philippines, Thailand and Indonesia with replies from other HAMs.



This motivated me to use my yagi antenna almost every day, quoting 9V1YP "Poke the sky"!

So what happens when the satellites are out of sight? There's really nothing else to poke out there. This was when I got bored cursing



at those buildings in front of me. Then I started thinking about RAE theory. If I could bounce signals off the moon, the satellites, why not these buildings?

That gave birth to another experiment bouncing my APRS packets off these buildings.

To my surprise, the success was beyond my expectations. I actually managed to hit an APRS iGate in West Malaysia's Batu Pahat which got me to another station in Malacca!



Different buildings send signals to different direction Day after day I would point my yagi at these buildings in front of my balcony, although I must say there were fair amount of times between successes and failures. I began plotting these building for which direction it would send my signals.

Subsequently I decided to dive deeper into the facet of these buildings, each square or rectangular block presented a few angled surfaces to me.



I could bounce my signal backwards to the north (**Remember my balcony faces southwest**), I could bounce it towards the north east. And then I found the side of two of these buildings allowed me to bounce my signals to the west! Yes, that's where I hit and held the SARTS repeater successfully.

Antenna a powerful part of transceivers

We often look at how much power our equipment can transmit, often a very good antenna setup gets us our contacts with very little power needed. I could now trigger and hold the repeater at 0.5W!

In conclusion, I hope this article provides an alternative to those of us facing similar challenges. I learn as a HAM, to be creative, to explore within the boundaries and rules governing this hobby and never give up since there are always many solutions to a given challenge.

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