

Sending SMS Messages Through the ISS

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On Sunday July, 12 2020 at 06:00 UTC I sent myself three SMS messages through the International Space Station's APRS digipeater. Here's how I did it, but first a little background on my motivation for this project.

The screenshot shows a web browser window titled "Amateur Radio Stations heard via ISS - Mozilla Firefox". The address bar shows "www.ariss.net". The main content area displays a table of amateur radio stations heard via the ISS, with columns for call sign, status, frequency, and time. Below the table is a link to "Click on a callsign to see a detailed map." and a section titled "Recent activity" showing a log of messages.

Call Sign	Status	Frequency	Time
E24TVS-2	*	17.908	01:16:40:33
YC5YC	*	0.47417	01:16:41:30
YC5ABK	*	-1.35133	01:16:44:22
N1RCN-6	*	27.01917	01:17:38:38
W0IR	*	44.8075	01:17:45:29

Click on a callsign to see a detailed map.

Recent activity

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00:00:11:22 : KD9PML-7]APY03D,RS0ISS*,WIDE2-1,qAo,WABLMF-4::KS0C :Hello from Mike 73{40
00:00:12:33 : KS0C]TS1PTW,RS0ISS*,qAR,KC5ILO-12:`oS+l R/]@"o}=-
00:00:14:04 : KD9PML-7]T3PW0T,RS0ISS*,WIDE2-1,qAo,W0ARP-14:`t0Dl [/`"70}73 from MIKE via ISS_0
00:00:14:51 : KJ7NZL-6]APY03D,RS0ISS*,WIDE2-1,qAo,W0ARP-14::SMSGTE :@mycell SMS test via ISS{51
00:00:15:06 : KJ7NZL-6]APY03D,RS0ISS*,WIDE2-1,qAo,W0ARP-14::SMSGTE :@mycell SMS test via ISS{50
00:00:15:14 : KM6DF-1]CQ,RS0ISS*,qAo,W0ARP-14:=3451.15N/12027.30W-73' Via Satellite from CM94
{UISS54}
00:00:15:28 : KJ7NZL-6]APY03D,RS0ISS*,WIDE2-1,qAo,W0ARP-14::SMSGTE :@mycell SMS test via ISS{49
00:00:15:52 : RS0ISS]CQ,qAR,KI6WJP-4:]ARISS - International Space Station
00:00:15:53 : KJ7NZL-6]T1PUWR,RS0ISS*,WIDE2-1,qAR,KI6WJP-4:(`fl K[/`"B$}CQ CQ CQ - Live Op -
DN31 UT_0
00:00:17:01 : KM6DF-1]CQ,RS0ISS*,qAo,W0ARP-14::AB7DY :Hello from Dennis Santa Maria Ca. CM94
73s KM6DF
00:00:17:40 : KM6DF-1]CQ,RS0ISS*,qAo,W7KKE-13:=3451.15N/12027.30W-73' Via Satellite from CM94
{UISS54}
00:00:17:44 : VA7BW-9]APDR15,RS0ISS*,qAR,KI6WJP-4:=4911.70N/12254.02W FED and watered by
APRSDroid
00:00:17:52 : RS0ISS]CQ,qAR,KI6WJP-4:]ARISS - International Space Station

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KJ7NZL ^ v Highlight All Match Case Match Diacritics Whole Words 20

Confirmation of SMS messages forwarded by ISS

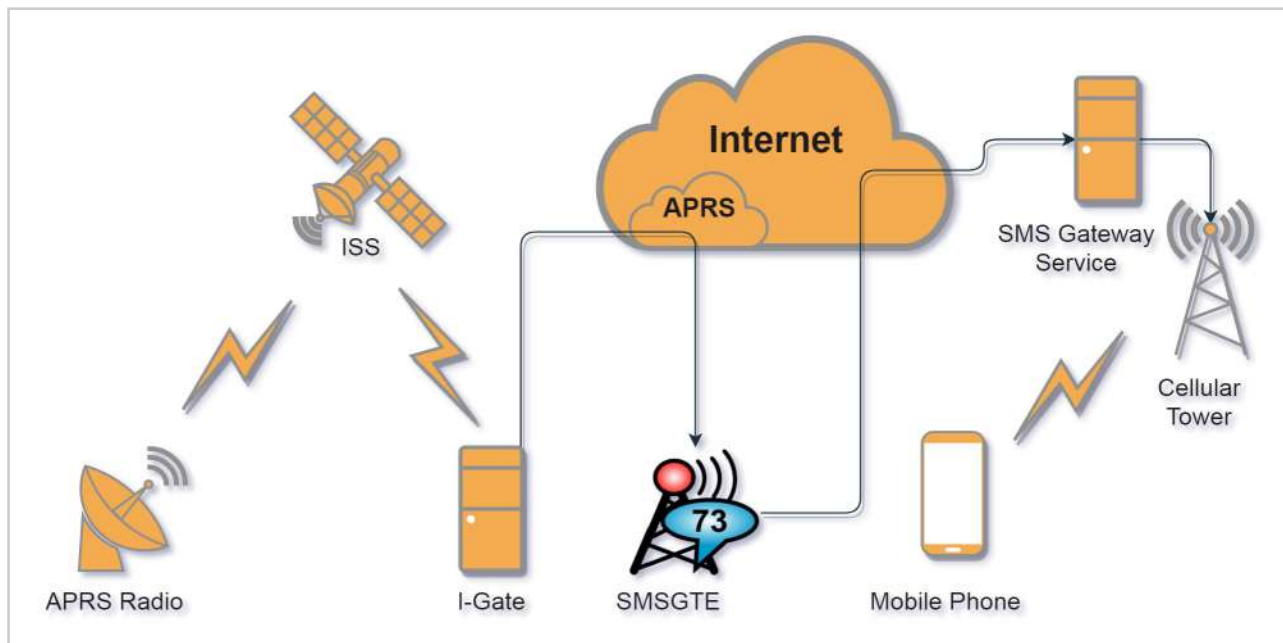
Why Even Bother?

The ISS has carried an amateur radio payload since its early beginnings. Part of this payload includes a radio that serves as a digipeater for APRS. Hams within the footprint ISS as it orbits can send and receive data packets containing messages that can be used to make contact with each other. There exists a number of various stations transmitting during any given pass. Some of these stations are just automatic beacons transmitting ever few minutes and some are actually other hams trying to make contact through the ISS. It's been my experience in my location within the United States that there have been mostly automated stations clogging up the airwaves with there stupid beacon transmissions. As a result trying to make a contact with another human through the ISS has been fruitless. As a result I wanted to make use of the ISS's digipeater as it traversed through space over my home. One day I discovered you could send SMS messages using APRS to the SMSGTE station. This station was attached to the internet and acted as a gateway for SMS messages onto the cellular networks. Curious I tried sending a message to myself with terrestrial stations receiving my transmission and routing my data packets onto the SMS gateway. Honestly, this was intriguing for only a minute or two since terrestrial stations are relatively common and the process was no more difficult than sending a SMS using my cell phone. One night while trying to establish a contact through the ISS's digipeater with another human (Seriously, is there anyone in the Mountain West area besides me even attempting ISS contacts?) I had the brilliant idea of sending myself a SMS message through the ISS. It's hard enough actually having your beacon APRS packets heard by the ISS, so I figured why not up the difficulty level by trying to send myself a message. Besides, I have to do something on those solitary nights when the ISS is flying over my house.

APRS SMS Gateway

SMS message flow between ISS and mobile phone.

The glue that hold this whole experiment together are APRS Satellite I-Gates and the SMSGTE APRS cellular gateway. Without these two an APRS packet could not be relayed by the ISS and sent to my phone. APRS Satellite I-Gates listen on the 145.825 Mhz frequency for APRS packets that are relayed by the ISS as it flys over. These packets are then routed through the APRS network to SMSGTE gateway, onto a SMS cellular gateway, and finally through the cellular network to my phone. To use the SMSGTE gateway, it's relatively straightforward. All you need to do is



transmit a message to SMSGTE in the following format: @<number> <message>

To: SMSGTE
@1235551234 Hello from space!

When the message is delivered, it will be display on the mobile phone like so:

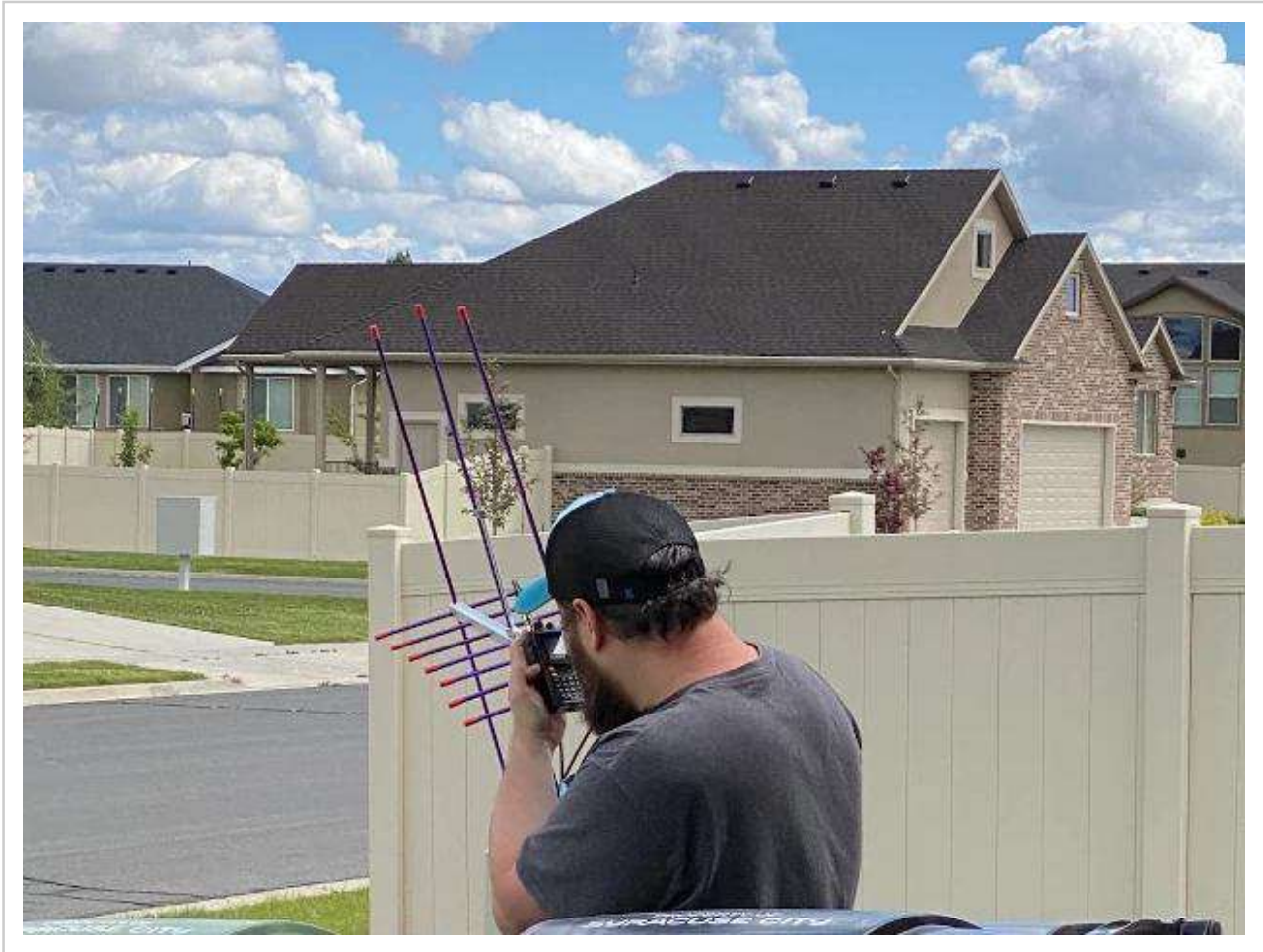
@KJ7NZL-6 Hello from space!

This is all you really require do to start using the SMSGTE gateway, but if you want to mask a person's phone number within your APRS packets you can achieve this by using an alias. You can set these up by registering as user on smsgte.org (<https://smsgte.org>).

Sending A SMS Message Through the ISS

The key to sending a SMS message through the ISS is preparation. For me a Typical ISS pass for me is about six minutes and thirty seconds long. In that time I have to locate the ISS, queue up my message to the SMSGTE gateway, and transmit my message to the ISS. I don't have a fancy setup with an azimuth and elevation rotor and circular polarized beam antennas; I'm merely working with my trusty Yaesu FT3D and handheld Arrow II antenna. As a result it takes a minute or two find the ISS and you can easily loose track of it while navigating through the menus on the FT3D with one hand. To help shortcut some of the process I actually construct the message on the FT3D prior to the upcoming ISS pass and transmit on 145.825 MHz just before the ISS appears on the horizon. Since this message isn't received by anything an acknowledgement isn't sent to the FT3D. This adds

the message to a queue of unsent messages the FT3D will try a resend after a minute or two. I'm able to manually try and resend these messages while they are in the queue. This allows me to focus on tracking the ISS while barely needing to check the radio's screen, only needing to for a few seconds at a time to make sure I click on the message transmit button. Once the ISS receives my APRS message a confirmation message from RS0ISS will display on my screen and I'll receive the SMS message on my phone a second or two later. This sounds relatively straightforward, but in practice it took me a few weeks of trying to get the process down.



KJ7NZL using the Arrow II antenna.

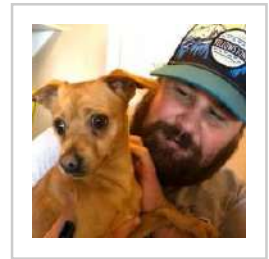
Next Steps

Now that I've accomplished my goal of sending a SMS through the International Space Station's APRS digipeater, I need to try something new. When I sent my first messages I used five watts of power. The lowest power setting on my FT3D is 300 milliwatts, and I'm curious to know if I can actually reach the ISS with that little amount of power. I believe it's possible, but I'm going to need to make sure I'm

aiming my antenna directly as the thing as it passes overhead. The next goal I have is to actually reply to my SMS message once it's received. This may be more difficult if not impossible. It's possible to reply to an SMS message and receive the response as an APRS packet from your radio. However, I'm unsure what digi path the SMSGTE gateway uses, but I suspect it's not setup to relay packets to the ISS. Even if it were, this may require me to be under the same ISS footprint as the SMSGTE gateway. I'll have to reach out to the owner of the gateway to find out more information.

Robert V. Bolton

Hi, I'm Rob. That's me on the right with my dog Garbage. He's pretty dumb, but I still love him. I've been involved with ham radio since 2006. That's not completely accurate. I was first licensed as a Technician in 2006, but quickly lost interest in the hobby. I allowed my license to expire in 2016, but in 2020 I gained a renewed interest in ham radio and I've been involved ever since. Some of my interest include satellite operations, digital modes and digital voice modes. I recently started delving into the world of ham radio contesting. If you like what I do, then why not buy me a coffee (<https://www.buymeacoffee.com/kj7nzl>) sometime.



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