THE OUTERNET

The Outernet's stated goal is to "create the world's most pervasive information service." The Outernet is a system-in-development which is on a quest to bring information—current news and weather as well as reference material and arts and literature—to the communities worldwide who do not have consistent access to the internet. Some estimates state that 40 percent of world population does not have regular internet access due to remote location, poor telecommunications infrastructure, or high access costs. The Outernet is meant to be an option outside of other endeavors by large corporations, such as Google's Project Loon and Facebook's Internet.org.

The Outernet adheres to a model more similar to the transistor radio. The transistor radio revolutionized mass media, its portability and inexpensiveness made information over the airwaves much more available worldwide. The premise of the Outernet is for satellites to transmit data files by radio which can be received by small inexpensive electronics, and like AM/FM radio, can do so freely and anonymously, without tracking user behavior.

The question for Outernet then is how to develop a system outside of government or large corporation income streams which can support the expense of a worldwide satellite service. The three main criteria that the Outernet strives to meet are: low cost, so that the price of a receiver is as accessible as possible; ease in set up and use, so that it can include people without very much technical knowledge; and that it generate some kind of income stream to support the satellite service, which is crazy expensive.

Since the Outernet launched in 2014 with crowdsourced funding, it has undergone two major revisions in its transmission and receiving station designs, and is in the middle of developing its third iteration.

THE FIRST ITERATION was a system which centered around a 'Lantern' computer unit (or a Raspberry Pi-computer-based alternative) and a fairly large (60-90 cm) satellite dish to receive a continuous download of about one GB per day of content, which included ebooks, videos, PDFs, images, apps, and others. The Lantern contained a Wi-Fi hotspot which users could connect to with their devices and peruse, read and copy the collection of digital materials. There were public participation features rolled in, including some twitter feeds and a means by which individuals could upload files (of certain limited specifications) to a website to be fed to the broadcast stream. The service was worldwide on the Ku-band, which used the Galaxy 19 satellite in the US. After a few months of analysis and feedback, it was determined that the dish antenna was cumbersome and difficult to point, making the barrier to entry too high for wide adoption. The Ku-band radio service ended in the Fall of 2016, switching to service on the L-band on the Inmarsat satellite constellation.

THE SECOND ITERATION focused on portability and ease in setup. The 'patch' antenna for the L-band service was about five inches square and could be pointed very generally toward the satellite, somewhere between laying flat and at a 45-degree angle. The transmitted radio signal was handled by an inexpensive software-defined radio USB dongle and a small CHIP computer, which like the first iteration was accessible by Wi-Fi to read and retrieve the collected data files, though using a different operating system interface, the 'Skylark.' The small setup and easy pointing made for exciting possibilities for wide use in traveling and remote contexts—for example for use on boats and ships at sea—and there was more integration of ham radio emergency networks (APRS) and weather forecasting information (GRIB files). At this time the submission of files by the public was essentially stopped, presumably put on hold until the Outernet technology and system was fully established.

The downsides of this second iteration were much more limited data transfer—about 20mb per day—and very high prices for L-band lease. In addition, the CHIP computer, manufactured by a separate unrelated company, was in short supply. Outernet L-band service was shut down in December of 2017.

THE THIRD AND CURRENT OUTERNET ITERATION is underway as of this writing (Spring 2018) in a testing phase. The new Dreamcatcher product is a hardware radio and computer combined—essentially the SDR and CHIP of the second iteration rolled into one circuit board unit, with extra ports and features so that it can be used for wide experimentation beyond the Outernet service. The Outernet as a company appears to be strategizing a product-based income stream to support the mission of the satellite service.

This third interation of the Outernet system again uses the Ku-band of the first iteration, which has more capacity and is more affordable, and manages to keep the small form factor of the second iteration by being clever about the use of the radio signal itself. They use a LoRa chip which has the advantage of being very good at filtering out noise coming from other satellites and transmitters operating at the same frequency. In other words, they are able to handle interference really well to find the necessary signal, instead of relying on finding the signal through a large, very directional antenna and precise pointing.

The Outernet system as a whole is scheduled to be fully launched after this testing phase, in the summer of 2018, with an increase in data transfer up to 300 MB of content a day, which can support streaming audio, with later plans of increasing further for video transfer.

AT WAVE FARM

A receiving station based on the first Outernet iteration, Heidi Neilson's **OUTERNET LIBRARY BRANCH-WAVE FARM** was installed in June of 2016, and contanied a 'Lantern' housed within the bench structure. In November of 2016 the structure was retrofitted to recieve the L-band using a custom directional helix antenna mounted in the Ku-band dish, and the electronics replaced with a software defined radio USB dongle and CHIP computer, with a wifi hotspot signal booster. This system was in operation until the L-band service ended in December of 2017, and the system has been in standby mode, until revision and upgrade to Iteration #3.

TODAY you can experience *Outernet Library Branch-Wave Farm* **VINTAGE FILES** on your wifi device. At or near the *Outernet Libary Branch - Wave Farm* struture, connect to 'OUTERNET' wifi on your device and peruse files recieved from the Galaxy 19 satellite during the first iteration.

OUTERNET CONTENT

What exactly the content of a worldwide, free information service could/would/should be has been under extensive discussion over the course of the technological Outernet system developments. Here are some of the many questions and considerations under discussion:

Who exactly is the audience? If it is everyone worldwide, what information is it that everyone would need? Should we set up a core-content repository which is continually transmitted and updated, so that anyone new to the system would start building this up? Who will decide the content? Does it need to be filtered or edited, and if so what will the procedure? What about copyright? What about language? How should translation be handled? Should we have regional content? What news sources should be used? How is it best to integrate emergency announcements? What about pre-loading files to the memory of devices deployed to remote areas, so they don't need to wait for content transmission? What should the ratio of content be between different subject areas?

The Outernet vintage files now for perusal at *Outernet Library Branch – Wave Farm* are a good selection of the initial offerings arrived at as the Outernet system develops. These encompass a lot of material in the public domain, such as Wikipedia articles, Western literature in the public domain (such as Shakespeare), Khan Academy educational materials, resources which address farming in remote areas, as well as new bands and some custom-designed mixed-tape-like digital archives by individuals.

Wave Farm

Wave Farm is a non-profit arts organization driven by experimentation with broadcast media and the airwaves. Our programs—Transmission Arts, WGXC-FM, and Media Arts Grants—provide access to transmission technologies and support artists and organizations that engage with media as an art form.

Heidi Neilson is an interdisciplinary artist interested in giving visual and sensible form to the connections between people on the ground and off-planet conditions and infrastructure. Her work includes, recently: *Sonic Planetarium*, an immersive sound installation made from recordings of orbiting satellites; several works which involve receiving satellite transmissions (*Go GOES Radiotelescope, Beachball Antennas, Outernet Library Branch – Wave Farm*, among others); *Menu for Mars Supper Club*, a series of dinners envisioning Martian cuisine; and *SP Weather Station*, where weather data-gathering instruments serve as a hub for various activities addressing earth's atmosphere. www.heidineilson.com

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INSTRUCTIONS: to browse Outernet library vintage files connect to the local WiFi network Outernet. In your device's browser, visit outernet.is. Once connected, click the light blue square icon at the top left of the the Outernet window.

AN UNOFFICIAL HISTORY OF THE OUTERNET SO FAR

BY HEIDI NEILSON