# MeshConnect


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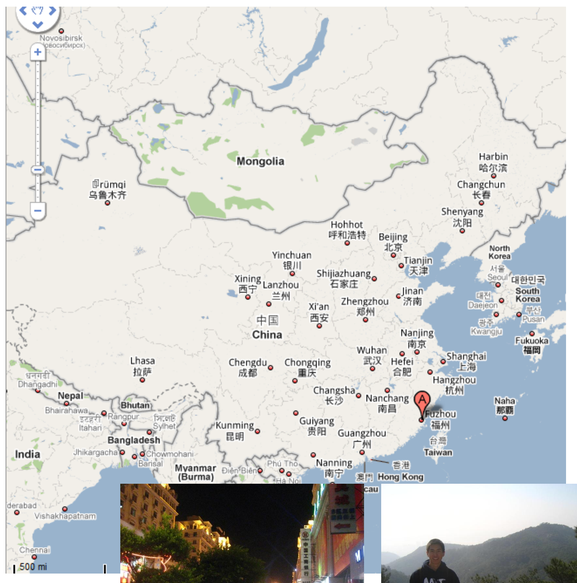
**Extending wireless Internet access to developing communities in China**

Massachusetts Institute of Technology

Tau Beta Pi The Engineering Honor Society

## Location: Fuzhou, China




**Fuzhou, China**
Province: Fujian
Total Population: 6, 830,000
Urban Population: 2,710,000

**Fuzhou University (FZU) & Trigmax, Ltd.**
FZU recently opened its wireless technology research laboratory, and is working with MIT to explore the applications of wireless in bridging the digital divide.



## The Digital Divide

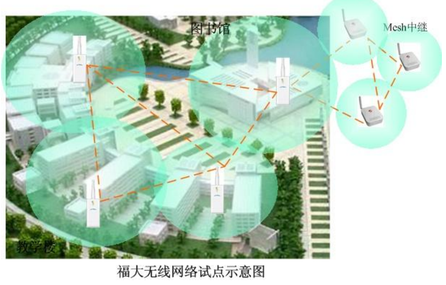

While wireless Internet is taken for granted in the developed world, Internet access is often unavailable in developing countries, such as much of rural China. Existing deployment models rely on either conventional fiber-based backhaul that is too costly and unsuitable for rugged environments, or wireless infrastructures based on cell phone technology with high cost and complexity that limits deployment in developing regions. The recently developed wireless mesh technology provides a solution for delivering wireless Internet access to semi-urban and rural areas. The aim of the MeshConnect project is to further adapt, develop, and deploy this off-the-shelf network equipment and open source technology to developing regions of China.

## Foundation Work & Initial Ideas

Last IAP, with the support of the MIT Public Service Center, MISTI-China, and our partners both here in the U.S. and in China, we traveled to Fuzhou, China and successfully introduced the latest wireless mesh technologies, creating a demonstration system for research and education at Fuzhou University.

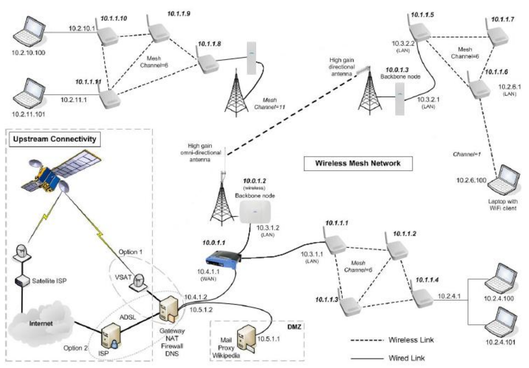
This summer, we had two objectives. The first was to go to China to deploy a carrier-class network for coverage of a large institution, such as the industrial business park, or other regions of the Fuzhou University campus. The second was to explore the extension of mesh networks outdoors to cover greater distance using more cost-effective devices.


## Mesh Networks Design & Implementation


福大无线网络试点示意图

The Internet bridges enable the extension of broadband signals over long distances, and the wireless mesh enables dense coverage over a short-range area. The below picture depicts how we deployed the technologies in conjunction. Long-range bridges (pictured in pink) extended access from an Internet source, and wireless mesh (pictures in blue) extended wireless coverage across an area, which student computers could then access.




## Accomplishments

Long-range Internet bridge

Medium-range Internet bridge

Wireless Mesh

1) We resolved signal interference with devices, and identified a combination of new hardware and software technologies for carrier-class hardware.

2) At Fuzhou University, we worked with the Network Center and our community partners, Trigmax LLC, and FWE Ltd, to design and deploy a large-scale outdoor network on campus. We also deployed a secondary network at Fuzhou’s Software Business Park.

3) We met with several government administrators both at the city-level and province-level.

4) For the fourth goal, we worked with Trigmax LLC and FWE Ltd on exploring devices and applications to utilize the deployed network. As an example, we are examining the integration of WiFi with camera technologies.

## Challenges

We encountered both engineering and cultural challenges. In terms of engineering, we discovered that having a large number of wireless devices on the network caused interference which had to be resolved by changing the device frequencies. Additionally, the software we developed had to be improved in order to enable the latest features from the Open Source community. Culturally, we found the opportunity to work with government officials, requiring us to familiarize with the customs and learn the workings of government.

## Impact

Many of the devices are hosted outdoors, in contrast to our indoor-only deployment over IAP, and coverage extends over both the library and the central teaching facilities, allowing several thousand students to access the wireless network. Our secondary deployment allows dozens of small businesses to utilize the wireless network.