Problem: Phone Calls Failed in Disasters

In disaster response, voice service failed due to …
- High volume traffic
- Damage on base station
- Limited power supply

Design considerations to improve resiliency of voice service:
- How to easily deploy VoIP system with high capacity and large coverage?
- How system can run in limited power?

Resilient Voice Service with Familiar Devices

Laptops / single board computers + Wi-Fi AP
- Low cost: available in home / cheap
- Easy to set-up / attach
- Low power consumption

Run PBX on those devices and inter-connect
- Quick, wide area deployment is possible
- How about call handling? Survivability?

Measurements: Capacity of PBX on Laptops / SBCs

<table>
<thead>
<tr>
<th>Devices</th>
<th>Max. simultaneous calls handled by PBX</th>
<th>CPU/Memory usage - Call load (no transcoding)</th>
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<tbody>
<tr>
<td></td>
<td>MacBook Air</td>
<td>BeagleBone Black</td>
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<td>MacBook Air 11”</td>
<td>Native</td>
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- All the devices can serve in neighbor (~50 users) without complex transcoding
- Complex transcoding reduce capacity significantly
- No big difference between 3 different audio
- CPU is dominant factor – need comparison with limitation by Wi-Fi
- Future work: How long can a PBX run with a battery?

Some of the devices in the measurements were supported by Ohm Pathom Tengkattrakul and the City of Palo Alto.