Measuring Resilience to Disasters of Telecom Systems

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Information Matters

- Telecom is important in disasters
  - Commercial cellular, wireline phone, Internet, social media
  - Government telecom systems
  - TV and radio, OTA and cable
- We need data on telecom systems after a disaster
  - Initially, to facilitate disaster response
    - Does lack of 911 calls mean that area is safe?
    - Did that region get info on evacuation plans?
    - Will work crews have access there?
  - Later, to facilitate repair and restoration
    - Reluctance to share info
  - In long term, to learn how to make systems more resilient to future disasters

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Status

- Even government agencies have limited info
- The FCC provides reports
  - High level, sometimes inaccurate
  - Relies on voluntary reporting, that is not verified

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3

3

FCC Report on cellular
Sept 29, 2017

Percent Cell Sites Out-of-Service By County

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4

4

FCC Report on cellular
Sept 29, 2017

State	Affected Counties	Cell Sites Served	Cell Sites Out	Percent Out
PR	ADJUNTAS	10	8	80.0%
PR	AGUADA	18	18	100.0%
PR	AGUADILLA	47	46	97.9%
PR	AGUAS BUENAS	20	20	100.0%
PR	AIBONITO	21	20	95.2%
PR	ANASCO	15	15	100.0%
PR	ARECIBO	69	68	98.6%

Examples of Information to Gather

- number of subscribers who lost service,
- specific services that were down, if not all
  - e.g. phone vs. text vs. Internet access
- whether QoS was severely degraded
  - e.g. very low data rates for Internet, high call termination rates for phone
- geographic areas in which service was lost, or severely degraded,
- time until service was restored for different subscriber groups and different regions,
- applications + content blocked/throttled in response to disaster
- any failures that specifically affected critical applications
  - such as 911, emergency alerts.

Providing More Info

- FCC should require more data, and make some of it public
  - But must balance need for information and burden on providers at worst of times
  - Perhaps merely encourage providing more data in short term, but require more in long-term
  - Aggregated data on commercial providers should go public
- Opportunities for third parties to collect and distribute
  - Sometimes to public, to government, and/or NGOs
  - Some good tools exist
  - CMU in discussions with FCC and Government of Puerto Rico about developing tools of use to them
    - *We welcome your input*

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