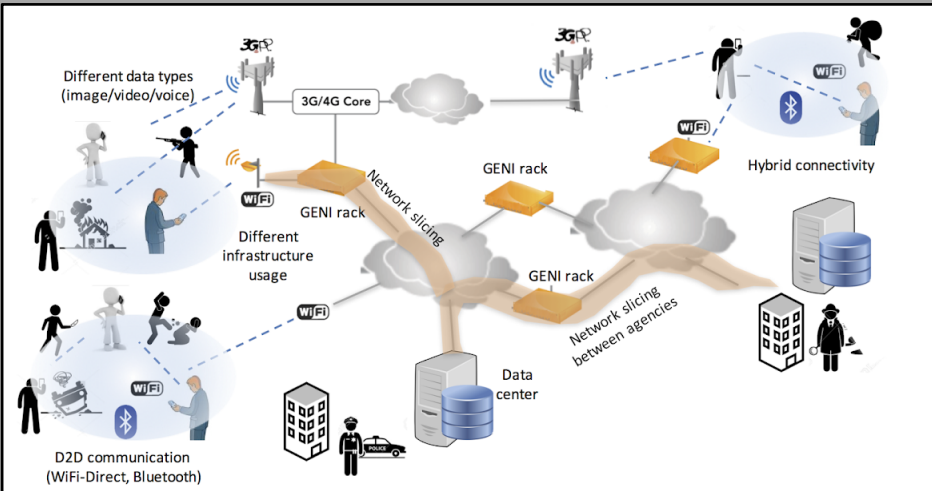


Multi-Agency Data Sharing Architecture for Smart Public Safety

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Motivation

Multi-agency data sharing enables analysis of data coming from different sources and allows us to **find answers or patterns on a bigger scale** and even do **better predictive analytics** due to having access to a larger data set. In the context of public safety, if officials of various agencies like police, fire department, Emergency Medical Services (EMS), FEMA and hospitals were able to share data seamlessly and securely during an emergency or disaster, they could **respond more efficiently to save lives** as they would have the most up-to-date information about the patient's allergic reactions, for example.



Problem Definition and Scope

How to solve the real-time data sharing problem specifically between two different campus emergency response teams, each being the owner of their institutional public safety data set?

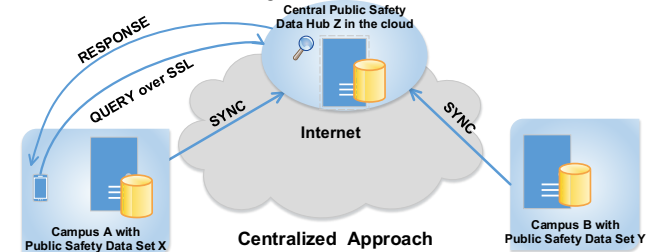
We consider the following **four challenges** presented by this problem:

- ❑ **Securely share** multi-agency data sets
 - ❑ How to quickly find a match in the distributed data sets of a Person-of-Interest (POI) in a picture shot by an end-user?
- ❑ **Respond in real-time** to end-user or public safety officials
 - ❑ How to respond to the end-user and campus public safety officials in real-time so they can take action effectively?
- ❑ **Protect** the identity of reporters
 - ❑ How to anonymize the end-user who sends pictures or videos of incidents so they are motivated to report suspicious activity?
- ❑ **Implement** multi-agency data handling policies
 - ❑ How to achieve seamless data sharing among the participating institutions while respecting institutional policies as they pertain to security, privacy, data sharing or data handling?

Approach

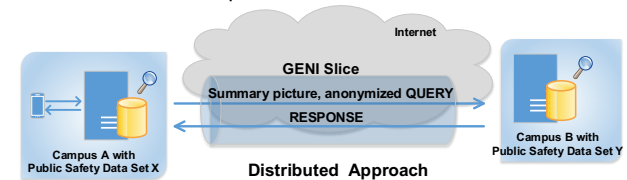
Centralized Approach

❑ In the first architecture, we propose that the data sets be transferred securely to a shared "data hub" in a cloud computing platform that implements security controls to protect access to the data. An end-user who belongs to one of the organizations snaps a picture and sends it to the data hub for real-time analysis. The results (e.g., the recognized faces in the picture) are shared back with the end-user as well as the officials of the organization.



Distributed Approach

❑ In the second architecture, we propose a distributed computational environment such that a picture/video of the POI sent by the end-user in one organization is sent to another campus to match against their public safety data set. This information is sent in a way that anonymizes the sender by the organization on behalf of the end-user. If a match is found at the second campus, the results are sent back to the first campus and communicated back to the sender.



Comparison

- ❑ **Pros of the centralized approach:** Can **find match quickly**, so can **scale** to multiple institutions; it can also implement better **centralized security**. However, it may not work for institutions that do not allow their data to leave campus. Moreover, response time depends on internet.
- ❑ **Pros of the distributed approach:** Caters to **institutional policies**, can **anonymize end-user** and GENI slice with Software-Defined networking can provide **QoS guarantees for emergency response**. However, searching distributed data sets across multiple agencies will take time.

References

- [1] Tung-Mou Yang, Terrence A. Maxwell, Information-sharing in public organizations: A literature review of interpersonal, intra-organizational and inter-organizational success factors, Government Information Quarterly, Volume 28, Issue 2, 2011, Pages 164-175.
- [2] "A Blueprint for Interagency and Cross-Jurisdictional Data Sharing", Nancy La Vigne, Ellen Paddock, Yasemin Irvin-Erickson, KiDeuk Kim, Bryce Peterson, and Samuel Bieler, July 2017
- [3] M. Manic, D. Wijayasekara, K. Amarasinghe, J. Hewlett, K. Handy, C. Becker, B. Patterson, and R. Peterson, "Next generation emergency communication systems via software defined networks," in Research and Educational Experiment Workshop (GREE), 2014 Third GENI. IEEE, 2014, pp. 1-8.
- [4] P. Conder, "Improving interoperability on a national level for law enforcement, public safety and security communications," 2008.