Federating Digital Contact Tracing using Structured Overlay Networks

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Overview

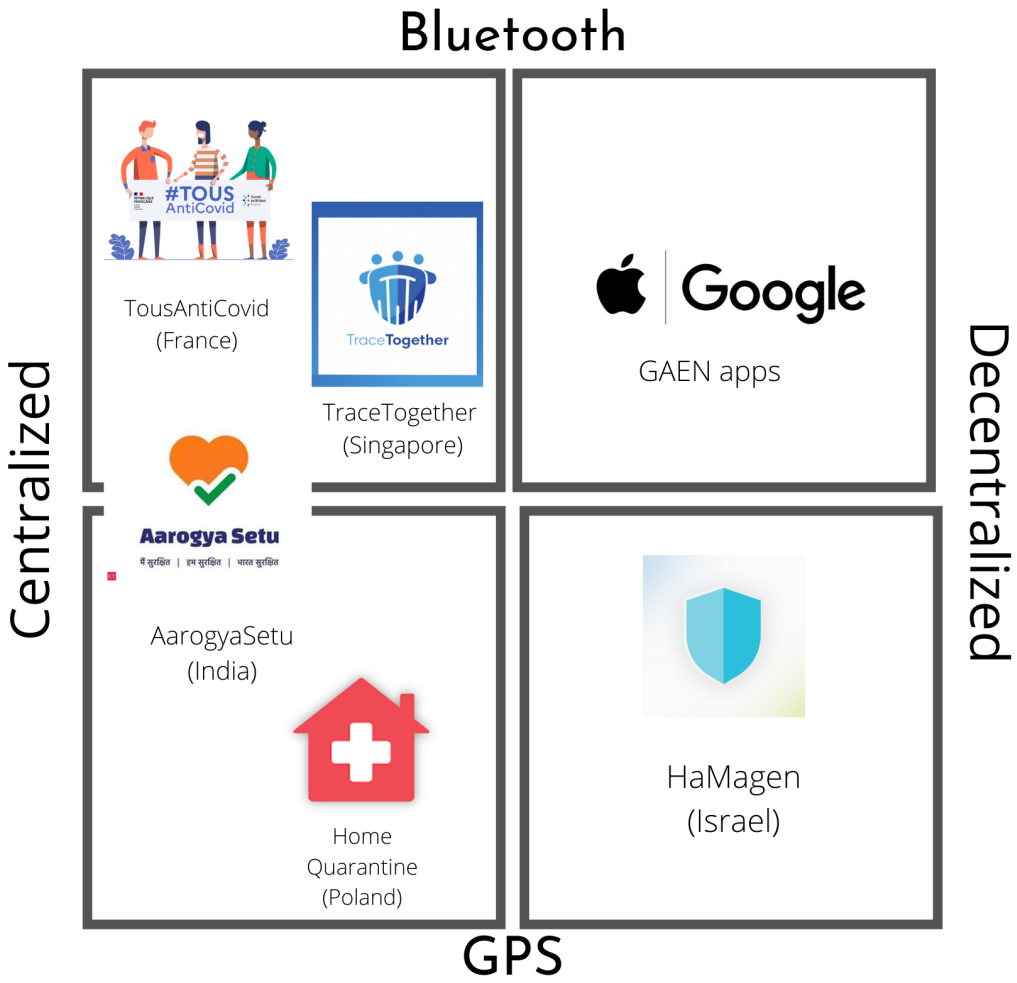
Introduction

- COVID-19 Pandemic: *Prevention*, *Testing*, *Tracing*
- Tracing: prevent further spreading and find origin
- Manual tracing $\rightarrow$ Digital tracing
- There is no/very limited interoperability
- Solution: Structured Overlay Networks

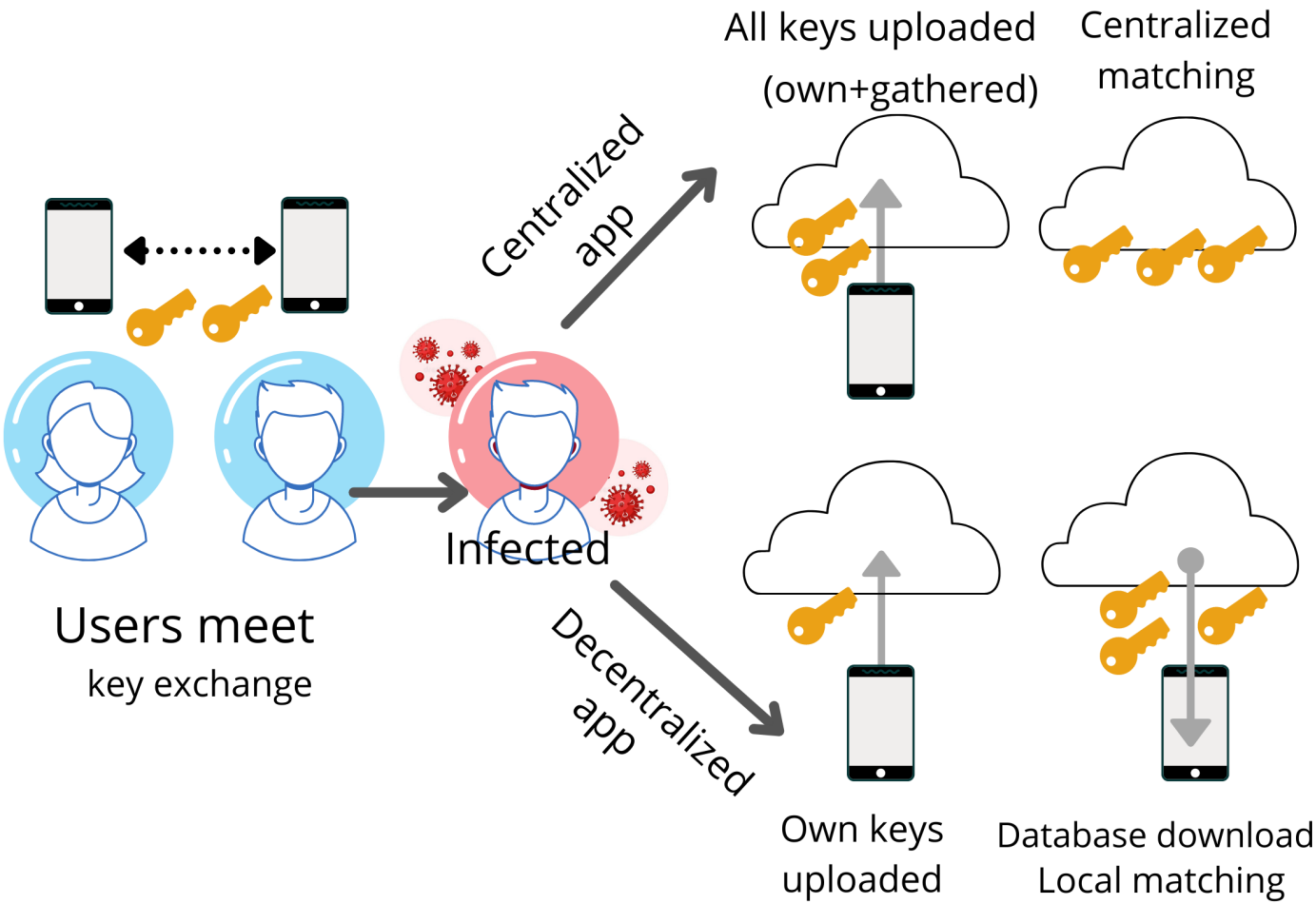
Digital Contact Tracing Applications

- Technology: GPS vs. Bluetooth
- System Architecture: Centralized vs. Decentralized

Digital Contact Tracing Applications



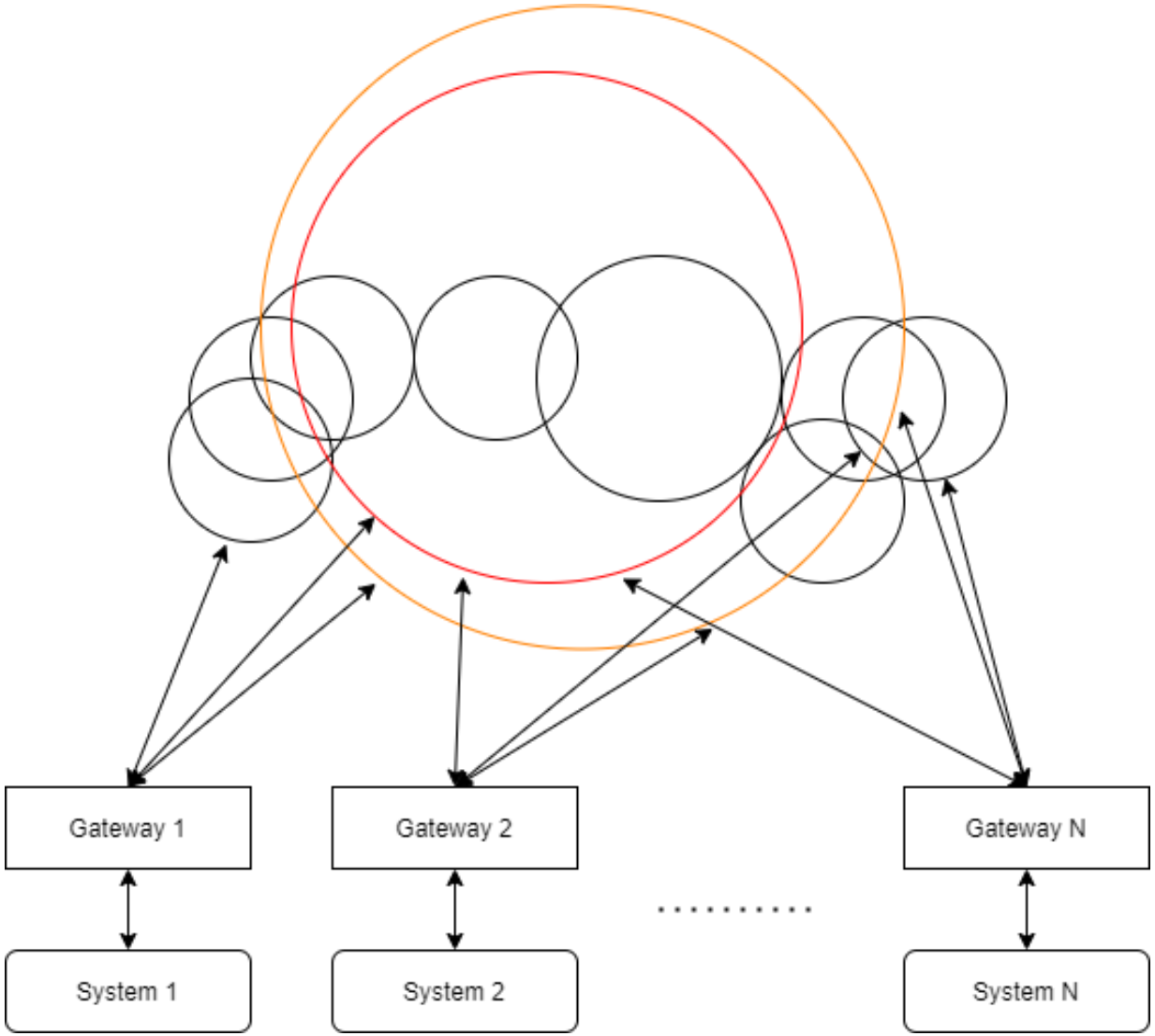
Digital Contact Tracing Applications



Auxiliary

- Overlay Networks
- Abstract State Machines

BAC19



BAC19

- $Chord = \{net_1, \ldots; net_N\}, N \in \mathbb{N}$
- $Network = \{red, amber\} \cup Chord$
- $contacttime() : (Chord \cup \{amber\}) \times Chord \rightarrow Time$
- $currentdate()$

BAC19

- `FindSuccessor` - linear search
- Newly identify cases to *red*
- Contacts to *amber*
- `Leave` *red* when heal
- Store contact times
- `Leave` after 14 days
- Inform contact of "amber" nodes (2^{nd} level contact)

BAC19

Theorem

The proposed extension stores and retrieves only up-to-date information on Covid-19 positive cases (identified by the origin systems) and their contacts and makes it available to all origin systems.

Discussion and Conclusion

- Interconnection is not built between each of two systems
- BAC19 does not violate privacy in the origin systems (does not store any personal sensitive information)
- Person does not install anything new on his/her mobile device (except a new application which is used in the region that this person is visiting)
- All contacts are calculated by the origin system
- BAC19 supports manual entry of recognized contacts

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