

ESCHEWING THE CLOUD BY USING LOCAL COMMUNICATION CHANNELS

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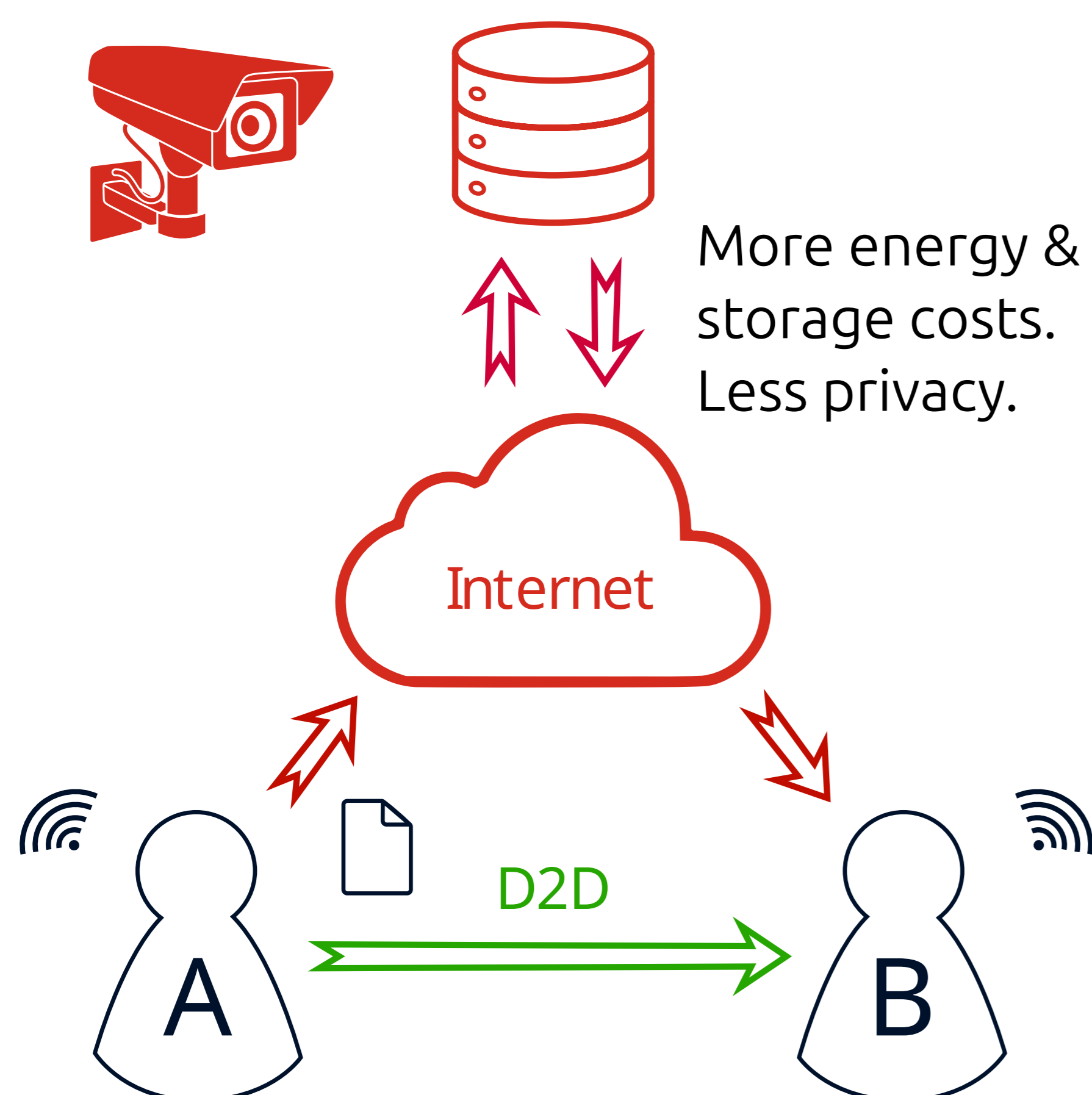
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CLOUD IS EVERYWHERE...

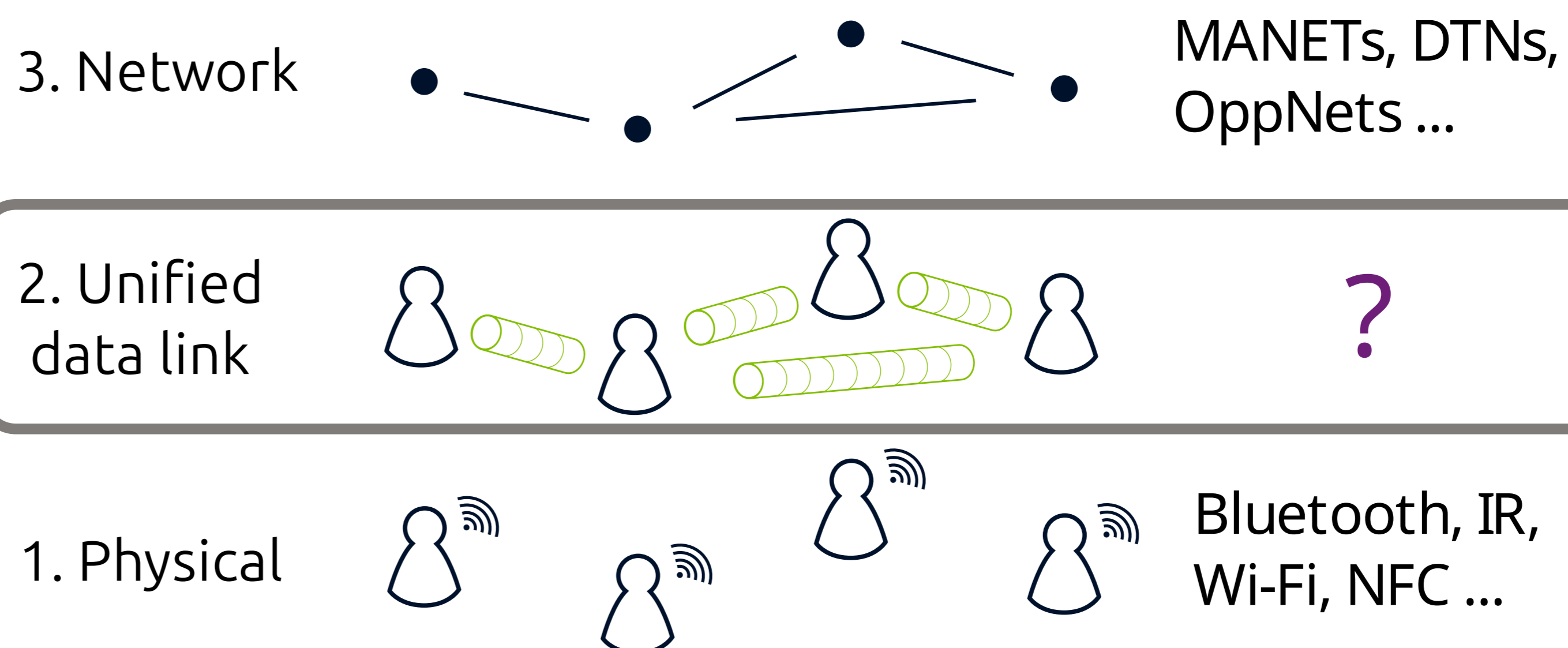
The vast majority of the software ecosystem relies on the cloud: services like video streaming or online gaming require servers in data centers and a network infrastructure. This however goes under the hood for users, whom aren't aware of the computers running kilometers away from their homes for them to benefit from said services. Even if invisible to end users, the cloud has a strong footprint [3, 2].

...BUT BRINGS IN ISSUES!

In some use cases, servers aren't strictly required. In peer-to-peer file exchanges, for instance, the cloud is not needed when peers are in the same vicinity. Yet, a survey [1] showed cloud is the most used mean to exchange files from one to another, even if a local **device-to-device (D2D)** approach features several advantages.



Disadvantages of using the cloud for inherently D2D use cases, such as transferring a file between nearby users.



Venice aims to abstract the physical layer of local wireless communication.

SOMETHING IS MISSING

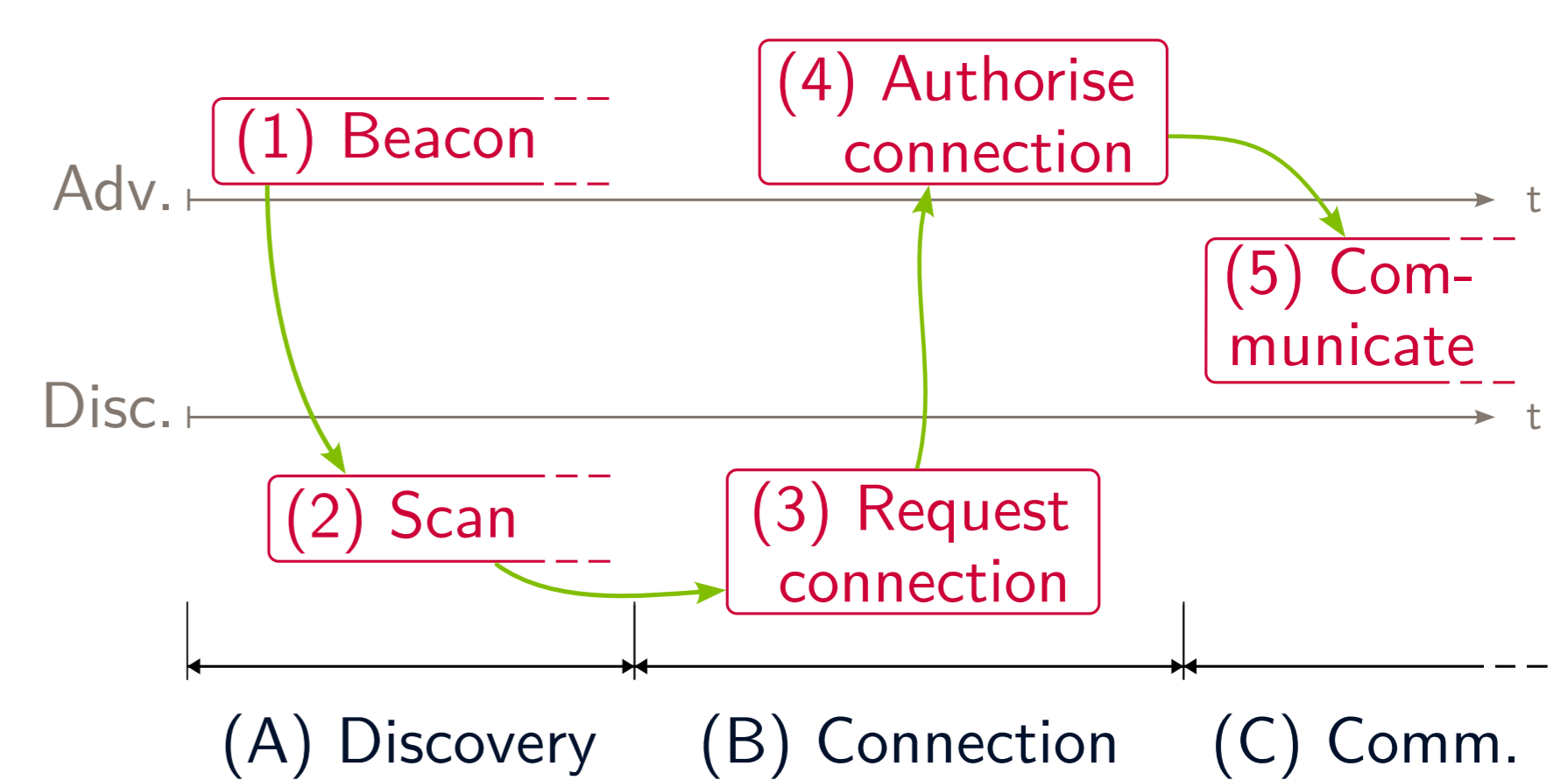
On one hand, D2D is locally enabled by a variety of technologies, including Wi-Fi, Bluetooth and RFID/NFC; on the other hand, at the network layer, many approaches, like *Opportunistic networks* [4], have been proposed to route D2D traffic. However, providing a D2D unified data link layer remains an open issue, due to the challenge of abstracting the vast heterogeneity of physical channels and platforms to the eye of upper application layers.

HERE COMES VENICE!

We propose a framework that abstracts the physical layer of local wireless communication, allowing developers to reason in terms of connection without having to delve into the specifics of the users' hardware stack.

CHANNELS

Venice relies on a set of abstractions, the most important one being the **channel** abstraction: each communication technology is encapsulated in a *BootstrapChannel* or a *DataChannel*, depending on whether it is used for connection initialisation or to transmit payload data. For instance, Venice can establish a *Wi-Fi DataChannel* transmitting connection information through a QR code *BootstrapChannel*.



Typical D2D connection process.

Venice remains agnostic to concrete channel implementations, which can be implemented independently and used interchangeably. This channel abstraction also allows the framework to think abstractly of the available communication technologies, and serves our end goal to abstract physical channels from developers and users, automating their selection so as to simply spawn a functioning D2D link.

REFERENCES

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- [3] Loic Guegan and Anne-Cecile Orgerie. "Estimating the End-to-End Energy Consumption of Low-Bandwidth IoT Applications for WiFi Devices". In: *2019 IEEE International Conference on Cloud Computing Technology and Science (CloudCom)*. Sydney, Australia: IEEE, Dec. 2019, pp. 287–294. ISBN: 978-1-72815-011-6. DOI: 10.1109/CloudCom.2019.00049. (Visited on 02/22/2024).
- [4] S. Trifunovic et al. "A Decade of Research in Opportunistic Networks: Challenges, Relevance, and Future Directions". In: *IEEE Communications* 55 (2017). ISSN: 1558-1896. DOI: 10.1109/MCOM.2017.1500527CM.