



# All-in-Cloud: Challenges and future expectations of AiC

Authors:



Yanqi Pan



Yunqing He



Chenghao Li

Harbin institute of technology, shenzhen

Index terms: Edge computing, Cloud computing, All-in-Cloud, data privacy and security, survey.



## Introduction

With the development of the advanced technology like 5G and IoE, the cloud is able to step forward to start its own revolution, from cloud period to edge period, and finally to AiC period.

In recent years, edge computing has been growing rapidly. According to IDC, by 2022 over 40% of organizations' cloud deployments will include edge computing and 25% of endpoint devices and systems will execute AI algorithms.

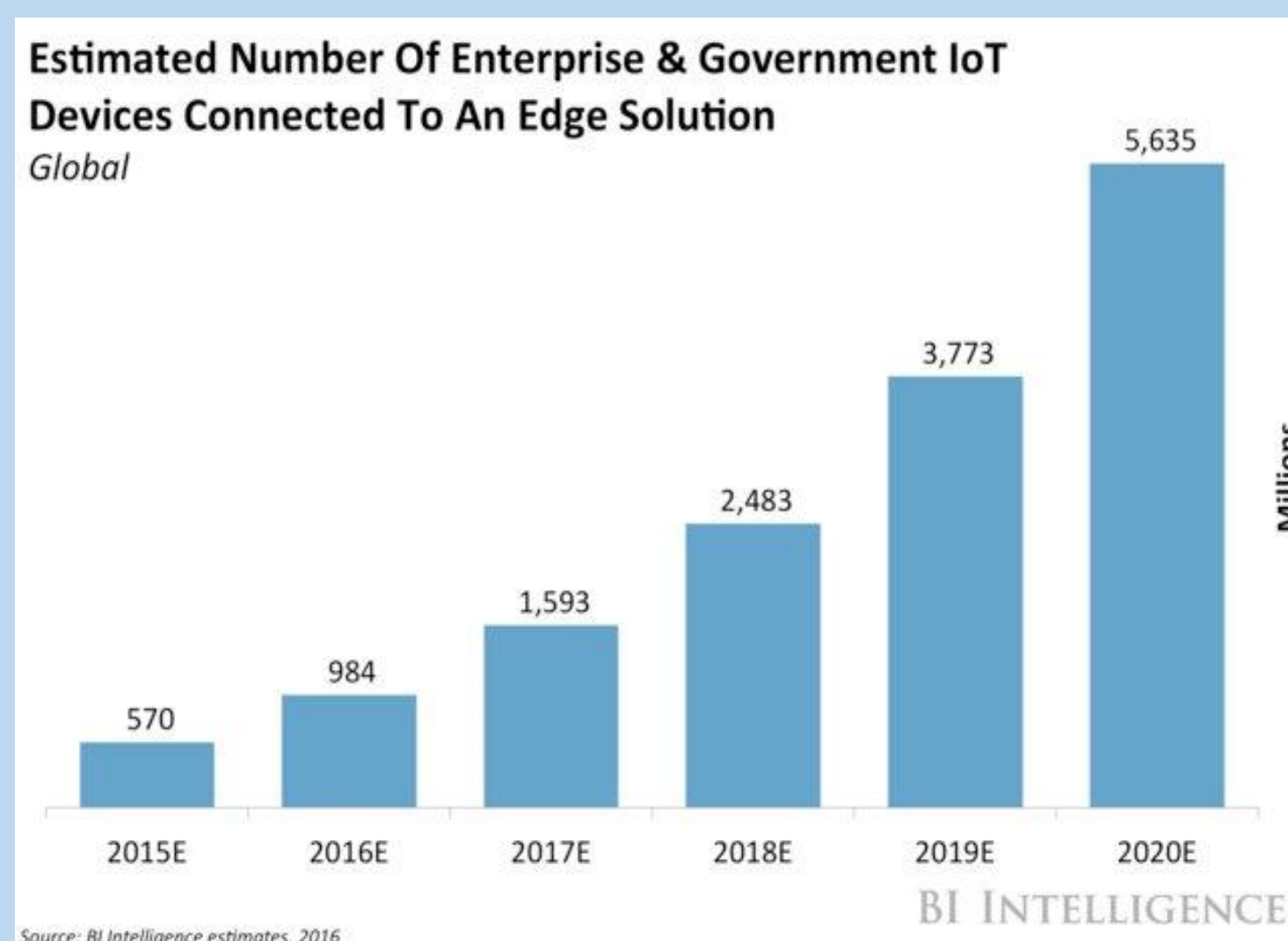


Figure1. EC devices

Compared to traditional data centers, the cloud has met its explosive increase, too.

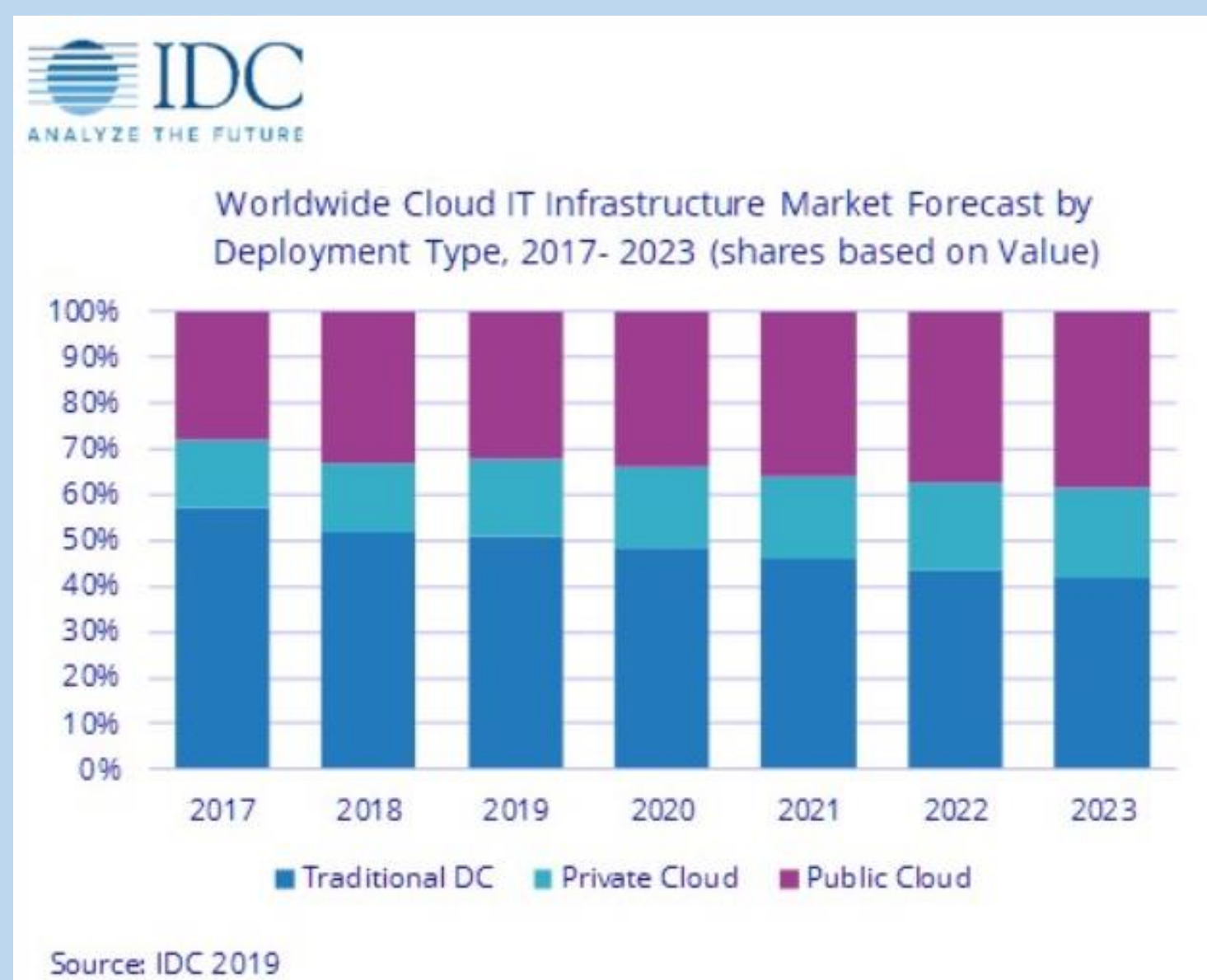


Figure2. Cloud infrastructure market sharing

This shows the trend of the development of the cloud. The cloud is stepping into All-in-Cloud period.

## The newest technology of the cloud : Today's AiC

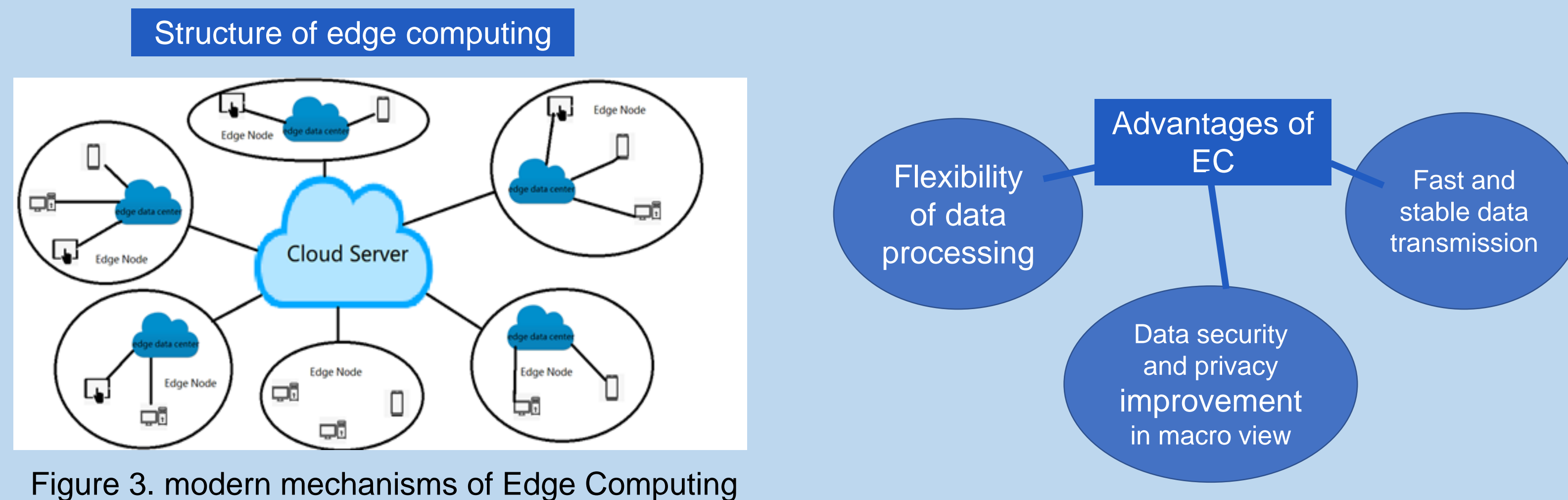


Figure 3. modern mechanisms of Edge Computing

Today's AiC is still very young, and most shows as the combination of cloud computing and edge computing. As a result, today's AiC challenges are similar to cloud computing and edge computing problems.

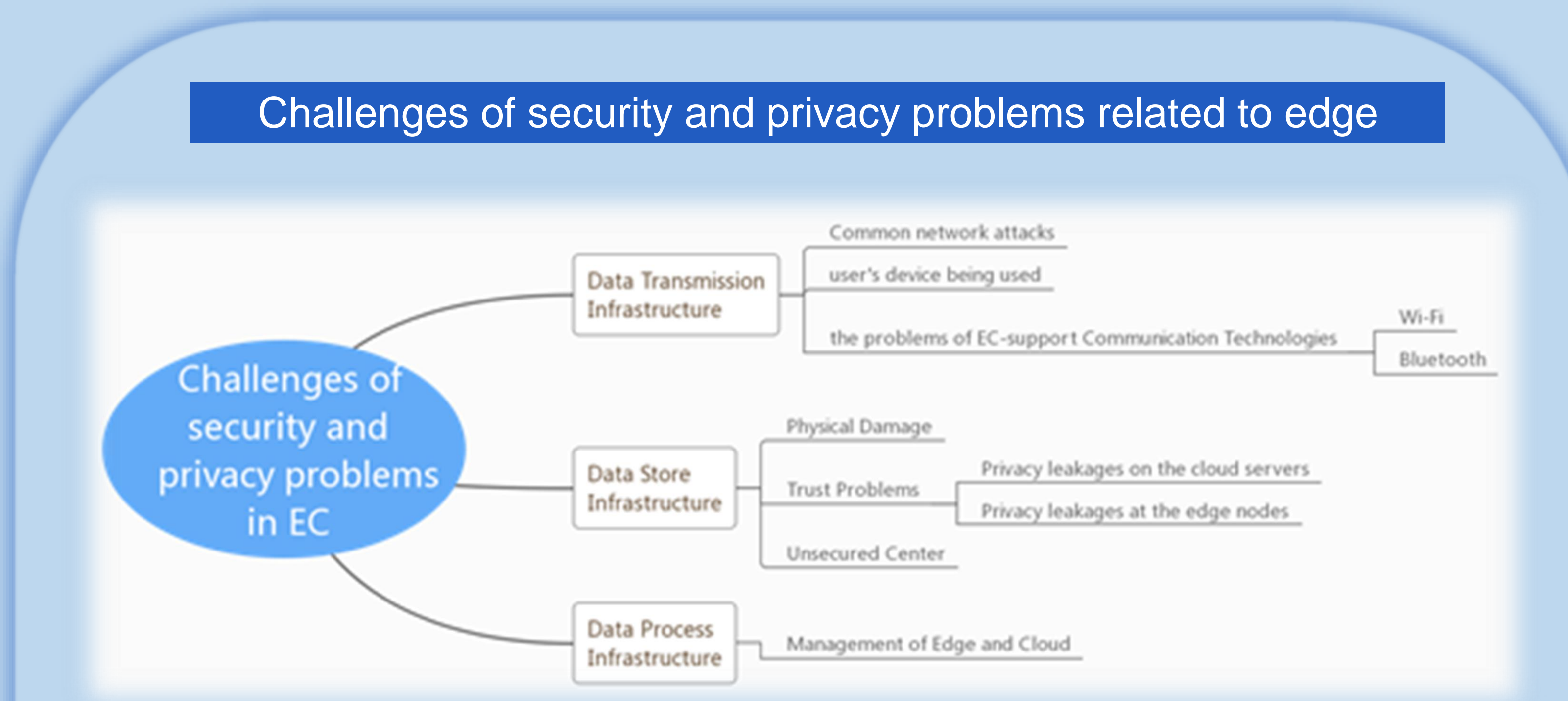


Figure 4. Conclusions of the structure of challenges of security and privacy problems in EC

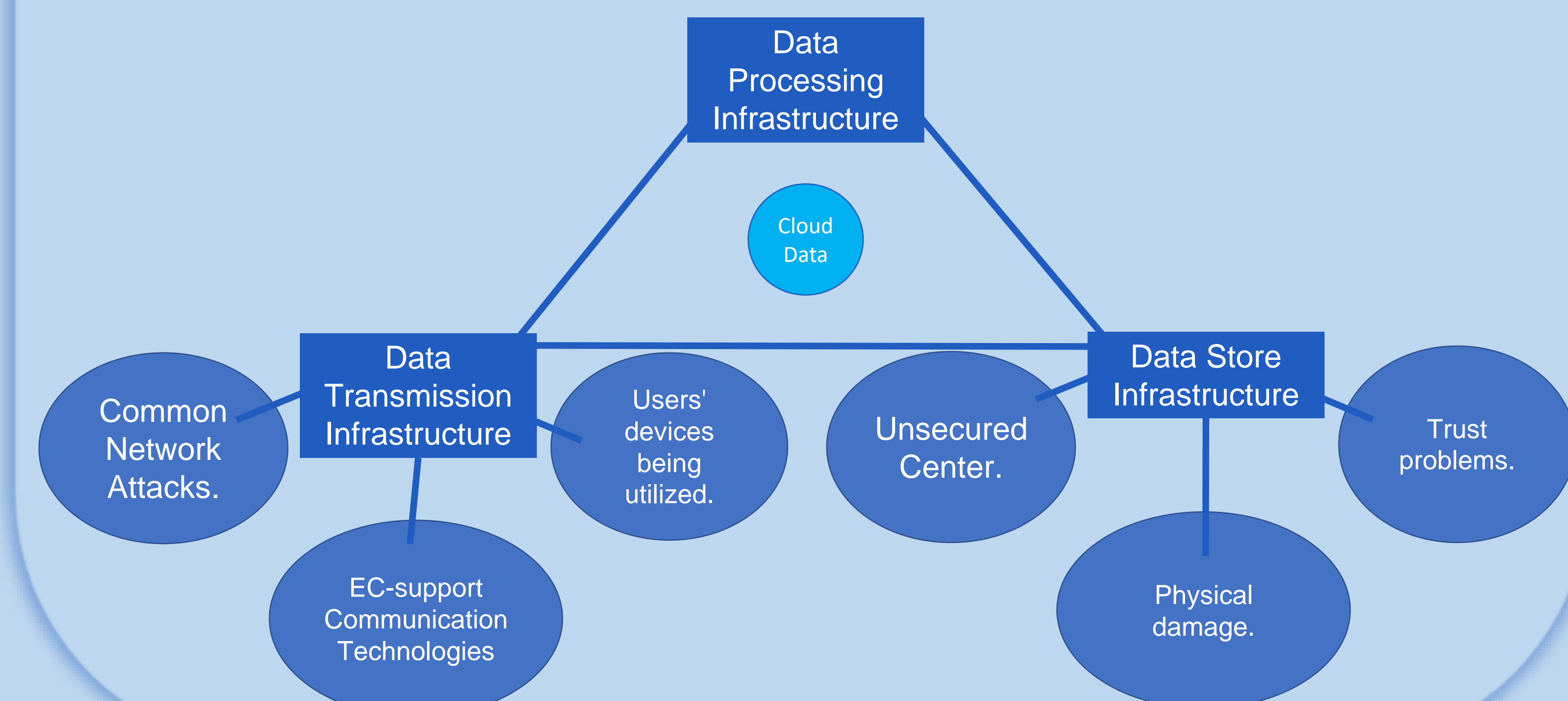
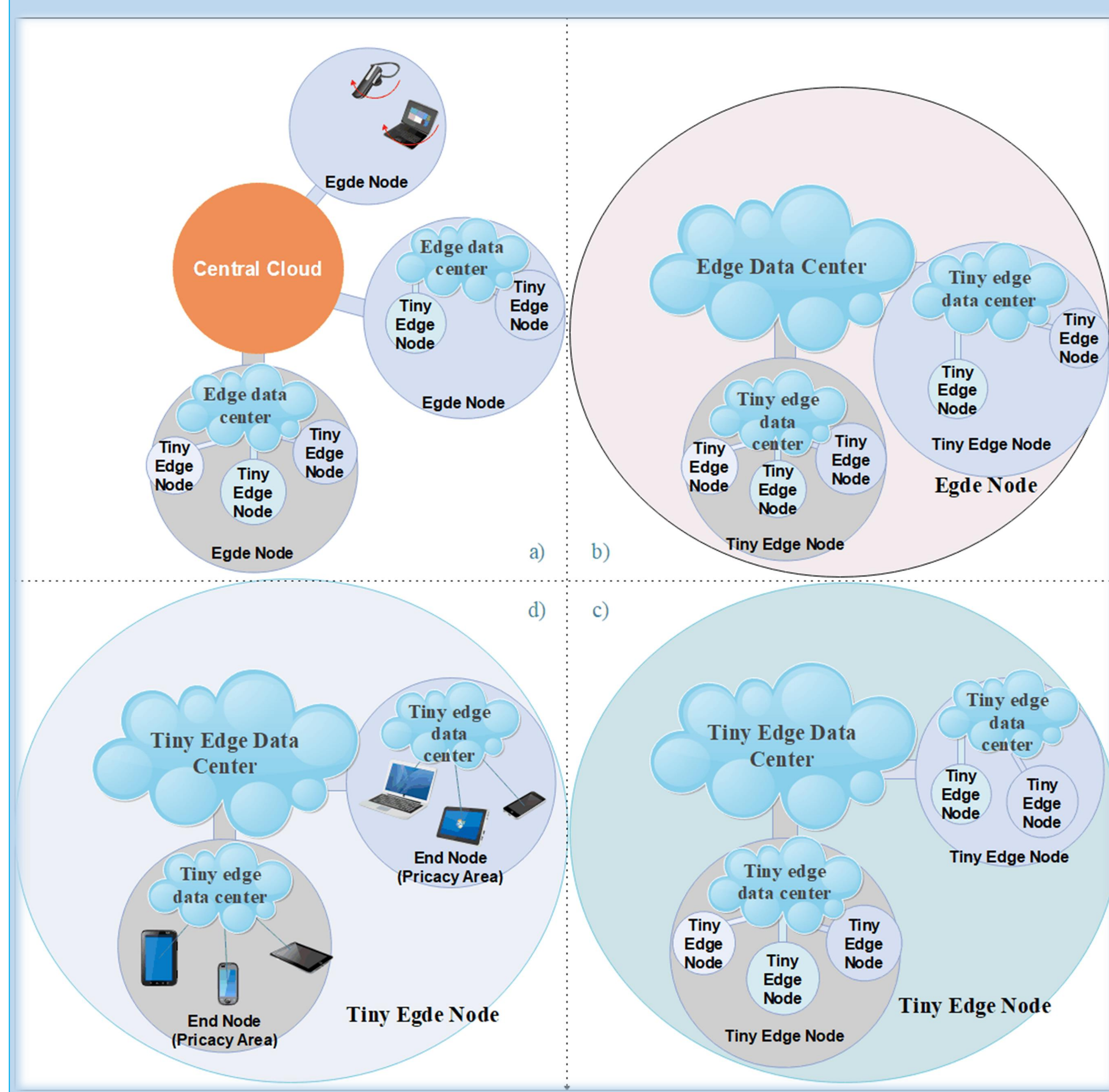


Figure 5. basic structure and concepts of AiC



## AiC: The future of the cloud

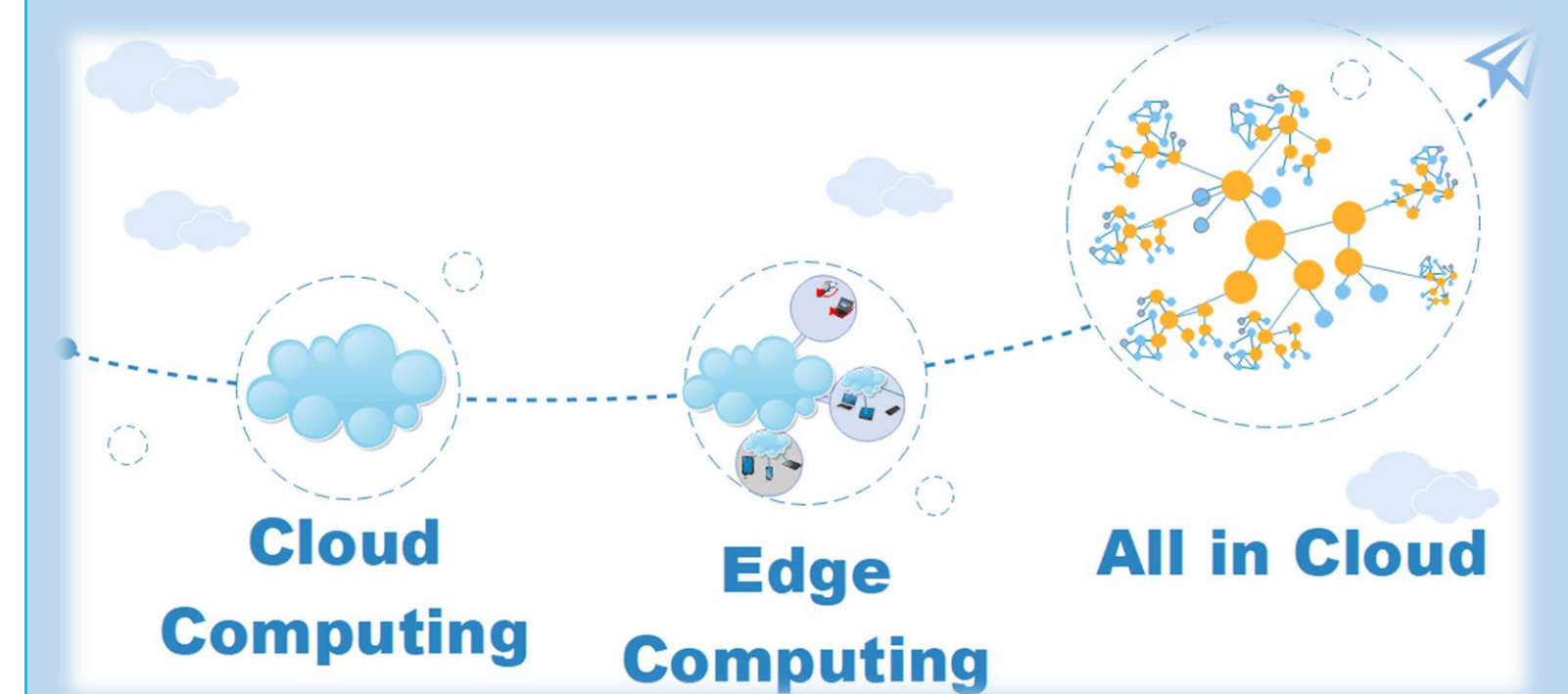


Figure 6. AiC: The future of the cloud

Figure 5 shows the basic structure and concepts of AiC: a) The EC-like model b) The Edge node c) The Tiny edge node (A recursive definition) d) The End node

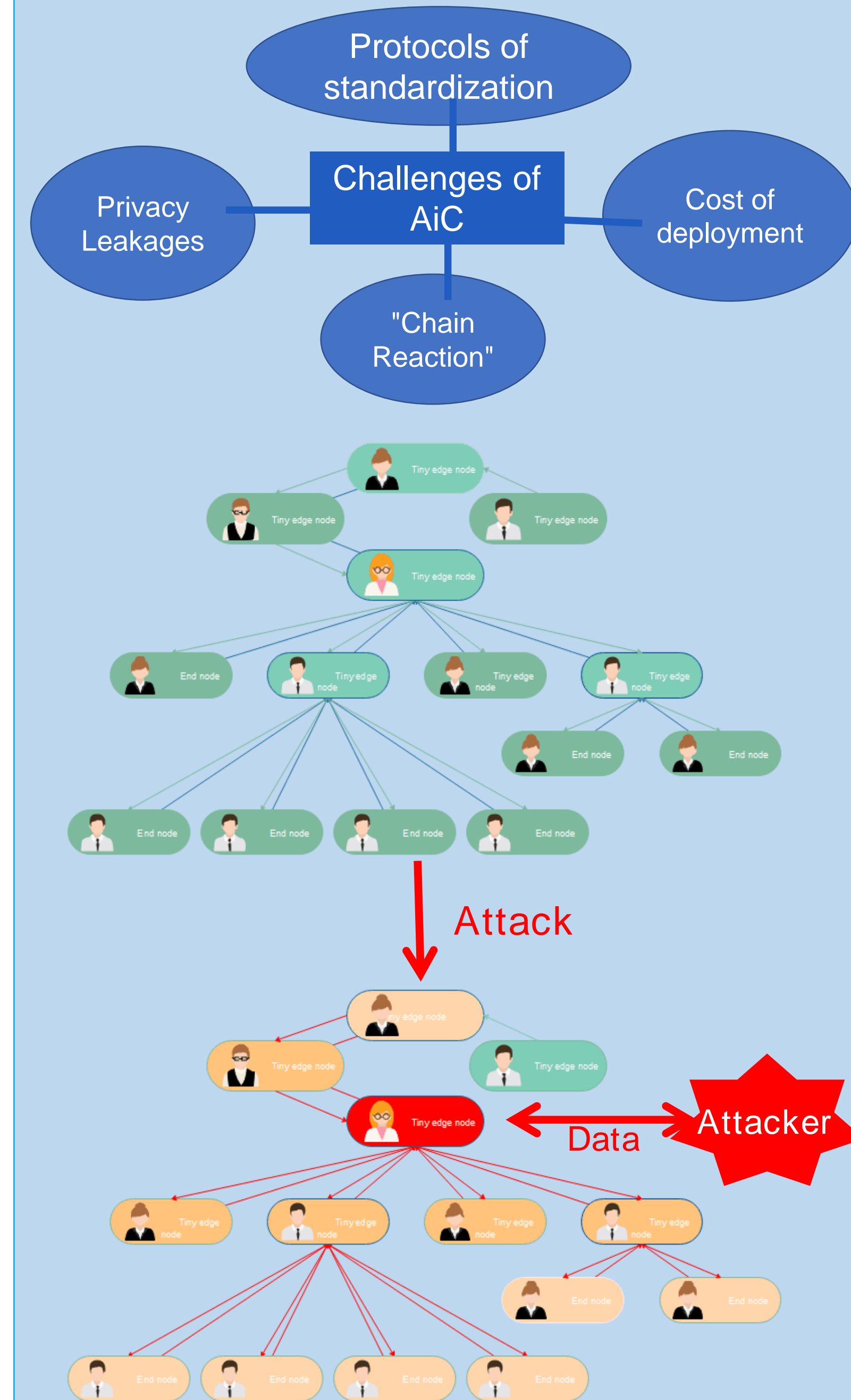


Figure 7. Chain reaction

Severe Chain reaction: The attackers can pass the wrong data to not only their lower level tiny data centers, but also their upper level edge data center /tiny edge data center/cloud server which in turn can pass the wrong data to all its lower level edge/tiny edge data centers.

## Comparison: CC vs EC

	Comparison Points	CC	EC
Data Transmission Infrastructure	Latency/Jitter/Packet loss	High/High/High	Low/Low/Low
	Geographical Position	1. Far from end devices, end users and some sensors 2. small quantity	1. Proximity to end devices, end users and some sensors 2. Dense quantity
	Open Challenges	Common network attacks	1. Common network attacks 2. Communication technologies problems 3. users' devices being utilized
Data Store Infrastructure	Storage Capacity	Limited	Unlimited
	Centralization	Centralized	Decentralized
	Open Challenges	1. Unsecured Cloud Center 2. Privacy Leakage	1. Unsecured Edge Data Center 2. Privacy Leakage 3. Physical Damage 4. Efficient Encryption Algorithms
	Computation Power	Limited	Unlimited
Data Process Infrastructure	Open Challenges	1. Privileges scalation 2. Abusing Privileges	1. Privileges scalation 2. Abusing of Privileges

## Conclusion

This paper focuses on the All-in-Cloud period and tries to give possible challenges of data privacy and security and future expectations of AiC. This paper uses a different view to construct the knowledge of the cloud, using time dimension to predict the future of the cloud. At the same time, the paper compares each period to propose the AiC structure and compares the essential differences than old version of cloud, which helps form the future work of AiC.