CTNDCI: Identifying the Challenges Towards a distributed Nano Data Center Infrastructure

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In this paper we identify the challenges currently preventing nano data centers from becoming the dominant form of content provision on the internet. With the global increase in IP traffic the question of how to provide and deliver data is becoming increasingly important. Monolithic data centers, as they are used today, pose several problems, such as high energy consumption and lack of scalability. An alternative solution mitigating the problems of monolithic data centers has been proposed in the form of a distributed nano data center infrastructure. Research has shown this to be a superior solution. However, no widespread solution based on a nano data center infrastructure has been implemented as of yet. By identifying the main challenges nano data centers are facing steps can be taken to overcome these challenges in a more focused way, leading to a more economic data distribution.

CCS Concepts: • **Computer systems organization** → **Embedded systems**; *Redundancy*; Robotics; • **Networks** → Network reliability;

Additional Key Words and Phrases: Green IT; Nano data center; Energy consumption; Security; Availability; Scalability; Data distribution

1 INTRODUCTION

2 STATE OF THE ART

2.0.1 ECHOS. ECHOS introduces a concept for Nano Data Center that can or should completely replace monolithic data centers [1]. The authors call it a radical solution for data management and provision. According to this concept, so-called "boxes" are set up at the edges of the network, eg. in home gateways (see [2]). These boxes communicate with each other via a peer-to-peer system. The peer-to-peer system as well as the bandwidth is controlled by a central unit, such as the ISP. However, the approach of networking boxes via a peer-to-peer system, and thus providing or sharing content, requires some conditions. So it is first necessary to provide a distributed hosting edge infrastructure. Furthermore, there are still some problems added. In ECHOS these are listed as follows [1]:

- "Lack of service guarantees due to uncontrolled interface between different application [...]."
- "Inefficient use of network's and other peer's resources and consequently supoptiomal performance [...]."
- "Even if sufficient status information is in place, still P2P is inherently unable to use it as it was designed around selfish user behavior and free-riding prevention mechanim [...]."
- "Absence of security and control make it impossible to guarantee the integrity and security of content."

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3 CHALLENGES TOWARDS A DISTRIBUTED NANO DATA CENTER INFRASTRUCTURE
3.1 Methodology
3.2 Challenges
3.2.1 Political challenges.
3.2.2 Technical challenges.
4 EVALUATION/RESULTS
includes research results and interview results etc.
5 DISCUSSION
6 ACHIEVEMENTS
7 CONCLUSION AND FUTURE WORK
ACKNOWLEDGMENTS
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A QUESTIONNAIRE
B INTERVIEW