Ensuring Minimal Operational and Optimizing Network Delay Changes Based Bandwidth Utilization

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ABSTRACT: The Internet of Things (IoT) extends connectivity beyond traditional computing devices to different types of smart objects, equipped with various sensors and actuators. These objects range from smart light bulbs and thermostats to smart watches and fitness trackers, or even heavy machinery used in various industrial sectors. Due to device heterogeneity, the complexity of developing applications that require the collection and sharing of data across multiple IoT devices is high, as developers need to be familiar with a diverse set of supported services and APIs. While existing approaches have proposed solutions to this challenge, they rely on the use of resourceintensivecloud-based components, they do not offer the degree of extensibility desired by developers, and they often trade off some of the richness of real-time data for ease of use. Cuttlefish is a flexible and lightweight middleware that offers a unifiedAPI to help with the development of applications that utilize multiple heterogeneous IoT devices.

It abstracts away much of the complexity involved with orchestrating different devices at runtime. At the same time, it avoids the aforementioned caveats of existing approaches through a simple and efficient design, yet one that offers a rich set of capabilities to developers.

I. INTRODUCTION

1.1 Mobile Computing

Mobile Computing is Human–Computer Interaction by which a computer is expected to be transported during normal usage, which includes allows transmission of data, voice and video. Mobile Computing involves mobile communication, mobile hardware, and mobile software. Communication issues include ad hoc networks and infrastructure networks as well as communication properties, protocols, data formats and concrete technologies. Hardware includes mobile devices or device components. Mobile software deals with the characteristics and requirements of mobile applications.

1.1.1 Devices

Some of the most common forms of mobile computing devices are as follows. Portable computers, compacted lightweight units including a full character set keyboard and primarily intended as hosts for software that may be parameterized, as laptops, notebooks, notepads, etc. Mobile phones including a restricted key set primarily intended but not restricted to for vocal communications, as smart phones, cell phones, feature phones, etc. Smart cards that can run multiple applications but typically payment, travel and secure area access. Wearable computers mostly limited to functional keys and primarily intended as incorporation of software agents, as watches, wristbands, necklaces, keyless implants, etc.

The existence of these classes is expected to be long lasting, and complementary in personal usage, none replacing one the other in all features of convenience.

Other types of mobile computers have been introduced since the 1990s including the:

- Portable computer (discontinued)
- Personal digital assistant/Enterprise digital assistant (discontinued)
- Ultra-Mobile PC (discontinued)
- Laptop
- Smartphone
- Robots
- Tablet computer
- Wearable computer
- Computer
- Application-specific computer

II. LITERATURE SURVEY

2.1 Next Generation Mobile Networks

The NGMN Alliance is an industry organization of leading world-wide Telecom

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Operators, Vendors and Research Institutes (see www.ngmn.org) and was founded by international network operators in 2006. Its objective is to ensure that the functionality and performance of next generation mobile network infrastructure, service platforms and devices will meet the requirements of operators and, ultimately, will satisfy end user demand and expectations. The NGMN Alliance will drive and guide the development of all future mobile broadband technology enhancements with a focus on 5G. The targets of these activities are supported by the strong and well-established partnership of worldwide leading operators, vendors, universities, and successful co-operations with other industry organizations.

2.2 Mobile Wireless Communication Enablers Twenty-Twenty

METIS (Mobile and wireless communications Enablers for the Twenty-twenty Information Society) is the EU flagship 5G project having the objective to lay the foundation for 5G systems and to build consensus prior to standardization. The METIS overall approach towards 5G builds upon the evolution of existing technologies complemented by new radio concepts that are designed to meet the new and challenging requirements of use cases today's radio access networks cannot support. The integration of these new radio concepts such as Massive MIMO, Ultra Dense Networks, Moving Networks, Device-to-Device, Ultra Reliable, and Massive Machine Communications will allow 5G to support the expected increase in the mobile data volume while broadening the range of application domains that mobile communications can support beyond 2020. In this paper, we describe the scenarios identified for the purpose of driving the 5G research direction. Further, we give initial directions for the technology components (such as link level components, multi node/multi antenna, multi-RAT (Radio Access Technology) and multi-layer networks and spectrum handling) that will allow fulfilling the requirements of the identified 5G scenarios.

III. SYSTEM ANALYSIS

3.1 Existing System

Emerging 5G radio capabilities and the convergence of radio access and wireless backhaul have triggered an uptake of fixed wireless technologies as a complement to fixed broadband. The network should be capable of handling the complex context of operations to support the increasingly diverse set of new and yet unforeseen services, users and applications. An additional

control on frame transmission for automatic adaptation of CW according to the present network congestion. The tuning of CW was performed by runtime estimation of the network status and load conditions. A runtime estimation of slot utilization which could probabilistically control the transmission of a station for achieving maximum channel utilization.

Drawbacks:
- Premonition of traffic jams, caution to an accident behind the next bend.
- It can be managed within the base station.
- A communication was interrupted due to a loss of a signal.
- The bandwidth requirements for front haul could be very high.

3.2 Proposed System

Hybrid access 5G networks will be able to provide the increased capacity needed to handle peak traffic for residential users. As such, 5G radio will increasingly complement and overlap with traditional fixed-broadband accesses. Centralized baseband processing tends to result in lower operational costs. It should provide flexible and scalable use of all available non-contiguous spectrums. The size of Contention Window (CW) increases if the transmission fails, whereas it decreases if the transmission is successful. The protocol leads to suboptimal performances due to its non-adaptive behavior, which is controlled in the 5G scheme. In a highly congested channel, a station should carry forward the channel status by avoiding blind resetting of CW to its minimum value, after a successful frame transmission.

Advantages:
- Vehicular Networks are a stylish, comfort and dynamic network of the Intelligent Transportation Systems.
- The design of 5G transport networks will need to continue to be affordable and sustainable, keeping the cost per bit transported contained.
- Programmable control and management.

Adaptive Scheduling Algorithm

Adaptive scheduling algorithm for base transceiver stations (BTSs-Base Transceiver Station) of 5G networks to improve energy efficiency, reduce carbon footprint, and develop a self-sustainable green cellular network. As system in achieving a high degree of cooperation among the neighborhood BTSs, which in turn increases the energy savings of the network. Each active As BTS independently and dynamically decides in

determining its operation state, thus make our proposed SAS algorithms fully distributed. The algorithms exploit a single-hop neighborhood information only and are fully distributed and self-sustainable.

Scheduling algorithms switch off a lightly loaded or a heavily loaded BTS, thereby transferring its load to a suitable pair of moderately loaded neighborhood BTSs and thus saving energy. The algorithm used for selecting a suitable pair of BTSs that helps in achieving improved load distribution and area coverage. As algorithm to decide on switching to the sleep state, requesting any other sleeping BTS to wake up, and notifying this BTS about the requirement for any power increment. Finally, algorithm increases the degree of cooperation among the neighborhood BTS's.

IV. SYSTEM DESIGN
5.1 GENERAL
Design Engineering deals with the various UML [Unified Modeling language] diagrams for the implementation of project. Design is a meaningful engineering representation of a thing that is to be built. Software design is a process through which the requirements are translated into representation of the software. Design is the place where quality is rendered in software engineering. Design is the means to accurately translate customer requirements into finished product.

System Architecture
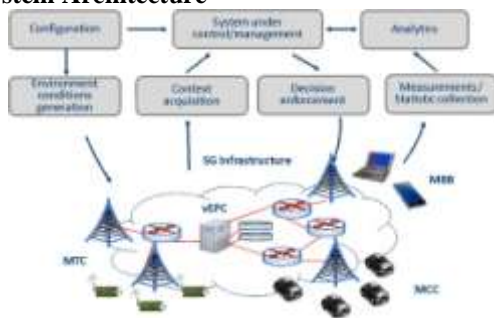
V. SYSTEM IMPLEMENTATION
Module Description:
1. Dynamic adaption:
In this module the network is created by which the mobile nodes are created based on the specified Internet Protocol addresses. After network creation the adaptation logic should be developed separately, for instance as a set of adaptation rules, by some adaptation engineer, and can be created/changed after the application has been deployed without affecting the running application.

2. Contention based channel access:
A contention-based protocol (CBP) is a communications protocol for operating wireless telecommunication equipment that allows many users to use the same radio channel without pre-coordination. The "listen before talk" operating procedure is the most well-known contention-based protocol.

A protocol that allows multiple users to share the same spectrum by defining the events that must occur when two or more transmitters attempt to simultaneously access the same channel and establishing rules by which a transmitter provides reasonable opportunities for other transmitters to operate. Such a protocol may consist of procedures for initiating new transmissions, procedures for determining the state of the channel (available or unavailable), and procedures for managing retransmissions in the event of a busy channel.

3. CW (Contention Window) Tuning:
Contention Window size in a distributed manner at run-time in order to maximize the throughput and fairness according to the idle back off interval statistics. Simulation results indicate that the proposed scheme provides a remarkable improvement in terms of the network throughput while maintaining good fairness.

4. 5G Data Plan distributed scheme:
The 5G Data plane distributed routing scheme was designed, and the performance was evaluated by a centralized algorithm in regard to the average and maximal end-to-end delays. The results demonstrated that the metrics considering the link- and nodal-delays outperforms current solutions, including probability-aware, capacity-aware, and hop-count methods, by an average of 13 %. From this scheme each mobile node can share files throughout the network. Another important topic in 5G carrier-grade mobile networks which may be improved by implementing NFV in cloud infrastructures is resilience. Implementing network functions in data centers allows transparent migration between either virtual machines or real machines. Furthermore, implementing mobile network functions in data centers will enable more flexibility in terms of resource management, assignment, and scaling. This impact the development of eco-systems and energy efficiency of networks, as over-provisioning can be avoiding by only using the necessary amount of resources.

5. Performance Improvement:

Performance improvement is measuring the output of a particular business process or procedure, then modifying the process or procedure to increase the output, increase efficiency, or increase the effectiveness of the process or procedure. Performance improvement can be applied to either individual performance such as an athlete or organizational performance such as a racing team or a commercial business.

Performance is an abstract concept and must be represented by concrete, measurable phenomena or events to be measured. There are two main ways to improve performance: improving the measured attribute by using the performance platform more effectively, or by improving the measured attribute by modifying the performance platform, which in turn allows a given level of use to be more effective in producing the desired output.

VI. SOFTWARE SPECIFICATION
GENERAL

This chapter is about the software language and the tools used in the development of the project. The platform used here is J2EE. The Primary languages are JAVA and MYSQL.

VII. THE JAVA PLATFORM
7.1 Java

Java acts as the front end, which drives its syntax from C and object-oriented features from C++. The main feature is platform independent. Java is popular among Internet programmers. It expends the universe of objects that can move about freely in cyberspace. Java can be used to create two types of programs, application and applets. An application is a program that runs on the computer, under the operation system of that computer. An applet is a tiny java program, dynamically downloaded across the network.

7.2 The Byte code

The output of java compiler is not executable code, it is byte code. It is a set of instructions to be executed by java run-time system called java virtual machine (JVM) it is an interpreter for byte code.

VIII. TESTING
8.1 GENERAL

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product it is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

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IX. CONCLUSION AND FUTURE ENHANCEMENT
9.1 Conclusion

The optimization models provide at finding the optimal dimensioning and planning for a mobile core network SDN and NFV. In terms of network load cost and data center resources cost. However, cellular networks involve challenges such as user mobility and diverse signaling/control plane requirements, which need to be considered when designing and provisioning such a virtualized platform. Trade-offs between the single objective models could be observed, in terms of the cost factors as well as data center locations. The 5G network will be a combination of multi-systems, multi-technologies which need to share the frequency spectrum as well as the physical infrastructure. Nevertheless, wireless and mobile networks will pose challenging issues regarding their integration in the future 5G wireless/mobile broadband world. Leveraging SDN and NFV for supporting and improving LTE networks remains an open issue that should address the way the network functions and components.

9.2 Future Enhancements

Furthermore, the challenges of the joint co-existence of SDN and NFV mobile core functions need to be investigated, e.g., orchestration and state distribution. Additionally, a heterogeneous access network can be modeled to represent more realistic use-cases for operators. Whatever the actual implementation, the technologies are being created and the capability is being developed to be able to implement the 5G requirements in order to meet the mobile communications demands of 2020 and beyond.

Early successes in test deployments will further enable modification of systems so that a functional system will be available in the next several years.

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