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Q1: Provide the names of 4 challenges that exist in Adhoc Networks.

Ans: There are many **challenges** in design, deployment, and performance of **ad hoc**: • Medium access scheme; • Routing and multicasting; • Transport layer protocol; • Pricing scheme; • Quality of service provisioning; • Security; • Energy management; • Addressing and service discovery; • Scalability; • Deployment considerations

Q2: How the nodes in the Adhoc Network know about the changing network topology.

Ans: Wireless Ad Hoc Networks

Wireless ad hoc networks are distributed networks that work without fixed infrastructures and in which each network node is willing to forward network packets for other network nodes. The main characteristics of wireless ad hoc networks are as follows:

- Wireless ad hoc networks are distributed networks that do not require fixed infrastructures to work. Network nodes in a wireless ad hoc network can be randomly deployed to form the wireless ad hoc network.
- Network nodes will forward network packets for other network nodes. Network nodes in a wireless ad hoc network directly communicate with other nodes within their ranges. When these networks communicate with network nodes outside their ranges,

network packets will be forwarded by the nearby network nodes and other nodes that are on the path from the source nodes to the destination nodes.

- Wireless ad hoc networks are self-organizing. Without fixed infrastructures and central administration, wireless ad hoc networks must be capable of establishing cooperation between nodes on their own. Network nodes must also be able to adapt to changes in the network, such as the network topology.

Q3: Why is it important to minimize flooding of control packets in Adhoc Networks and how MPR achieves it?

Ans: One way to minimize the broadcast expenses of routing protocols is to cluster the network. In clustered ad-hoc networks, all resources can be managed easily by resolving scalability issues. However, blind query broadcast is a major issue that leads to the broadcast storm problem in clustered ad-hoc networks. This query broadcast is done to carry out the route-search task that leads to the unnecessary propagation of route-query even after route has been found. Hence, this query propagation poses the problem of congestion in the network. In particular this motivates us to propose a query-control technique in such networks which works based on broadcast repealing. A huge amount of work has been devoted to propose the query control broadcasting techniques. However, such techniques used in traditional broadcasting mechanisms need to be properly extended for use in the cluster based routing architecture. In this paper, query-control technique is proposed for cluster based routing technique to reduce the broadcast expenses. Finally, we report some experiments which compare the proposed technique to other commonly used techniques including standard one-class AODV that follows TTL-sequence based broadcasting technique.

Q3: Explain briefly how Mobile Cloud Computing is different than simple mobile computing and simple cloud computing?

Ans: Mobile cloud computing:

Mobile cloud computing is an technique or model in which mobile applications are built, powered and hosted using cloud computing technology.

A mobile cloud approach enables developers to build applications designed specifically

for mobile users without being bound by the mobile operating system and the computing or memory capacity of the smartphone. Mobile cloud computing centered are generally accessed via a mobile browser from a remote webserver, typically without the need for installing a client application on the recipient phone.

This concept is also sometimes referred to as MoClo, a combination of MObile CLOud.

Simple mobile computing:

Mobile computing is human–computer interaction in which a computer is expected to be transported during normal usage, which allows for 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.

Simple cloud computing:

A simple definition of cloud computing involves delivering different types of services over the Internet. From software and analytics to secure and safe data storage and networking resources, everything can be delivered via the cloud.

You probably use different cloud-based applications every day. You are benefiting from cloud solutions every time you send a file to your colleague via the web, use a mobile app, download an image, binge a Netflix show, or play an online video game. All these services are stored in the cloud and exist in some digital space.

Q5: **Explain the term MBaas in your own words?**

Ans: To understand the value of a mBaaS definition, you need to have a good understanding of how a mobile app is developed. A mobile app consists of:

- **a front-end** – the User Interface (UI), in other words, what you see of the app when you use it.
- **a back-end** – the different methods hosted on a web server that are rendering data needed for the front-end to display the right content.

Mobile development team structure reflects this paradigm: front-end developers, on one hand, back-end developers on the other hand.

The front-end is some code that is running directly on the operating system of the mobile device. The problem is that there are many different operating systems out there – iPhone/iPad are running on iOs, Google OEM mobile

devices (ex: Samsung) on Android and Microsoft phones on Windows Phone–so ultimately there is a different code developed for each OS. That's the reason why a few vendors such as Appcelerator developed crossed platform development tools where you just develop with a single JavaScript source code base that automatically compiles into all native OS codes, leading to quicker time to develop an app, lower maintenance across devices and increased agility to develop new versions of the same app. But this is another story I may develop another day

Q6: **Imaging you visit a completely new city. What kind of services a modern LBS can provide you at your location automatically?**

Ans: While the first location based services (LBS) appeared in the early 1990s (e.g. ActiveBadge), LBS became a fast-developing research field only in the early 2000s, mainly due to the discontinuation of the selective availability[1] of Global Positioning System (GPS) by the U.S. President Bill Clinton in May 2000. This discontinuation has made GPS more responsive to civil and commercial users worldwide. Since that time, more and more GPS-based applications have appeared, resulting in a strong interest in LBS from both academics and industry. LBS can be defined as computer applications (especially mobile computing applications) that deliver information tailored to the location and context of the device and the user (Raper et al. 2007a; Brimicombe and Chao 2009). In 2007, Raper et al. (2007a, 2007b) provided a state-of-the-art review of the research field of LBS, and outlined several research challenges. Since then, there have been many changes in the field. First, recent years have witnessed rapid advances in its enabling technology, such as mobile devices and telecommunication. Second, there has been an increasing demand in expanding LBS from outdoors to indoors, and from navigation systems and mobile guides to more diverse applications (e.g. healthcare, transportation, and gaming). Third, new interface technologies (e.g. more powerful smartphones, smartwatches, digital glasses, and augmented reality (AR) devices) have emerged. Fourth, there has been an increasing smartness of our environments and cities (e.g. with

different kinds of sensors) (Ratti and Claudel 2016). And, finally, we have seen more and more LBS entering into the general public's daily lives, which greatly influence how people interact with each other and their behaviours in different environments. It also brings many opportunities (e.g. for traffic management and urban planning) and challenges (e.g. privacy, ethical, and legal issues) to our environment and human society. These changes open up a lot of basic and applied research questions to the LBS research community

Q7: **Explain why energy efficiency is important in technologies like Bluetooth and ZigBEE?**

Ans: This is the final post of a three-part series about different types of wireless networks and how they fit into the IoT and M2M world. If you want to check out other comparisons, click on these articles: ZigBee vs. Bluetooth and 6LoWPAN vs. ZigBee. Today we'll cover Bluetooth vs. Bluetooth Low Energy

Bluetooth is a another wireless technology standard (not a piece of plastic you stick in your ear for phone calls). Of course the two are related, but the wireless connection between your phone and the earpiece is called Bluetooth… not the piece itself. As you can imagine, Bluetooth was developed as a way to exchange data over a short range (like from your pocket to your shoulder) without the need for wires. That's why Bluetooth is used for wireless headsets, hands-free calling through your car, and wireless file transfers.

In engineering speak, Bluetooth operates in the 2400-2483.5 MHz range within the ISM 2.4 GHz frequency band. Data is split into packets and exchanged through one of 79 designated Bluetooth channels (each of which have 1 MHz in bandwidth)

Q9: **Explain briefly how you use RFID technology at INU on a daily basis when present on the campus? Do you use an active or passive tag?**

Ans: RFID belongs to a group of technologies referred to as Automatic Identification and Data Capture (AIDC). AIDC methods automatically identify objects, collect data about them, and enter those data directly into computer systems with little or no human intervention. RFID methods utilize radio waves to accomplish this. At a simple level, RFID systems consist of three components: an RFID tag or smart label, an RFID reader, and an antenna. RFID tags contain an integrated circuit and an antenna, which are used to transmit data to the RFID reader (also called an interrogator). The reader then

converts the radio waves to a more usable form of data. Information collected from the tags is then transferred through a communications interface to a host computer system, where the data can be stored in a database and analyzed at a later time.

As stated above, an RFID tag consists of an integrated circuit and an antenna. The tag is also composed of a protective material that holds the pieces together and shields them from various environmental conditions. The protective material depends on the application. For example, employee ID badges containing RFID tags are typically made from durable plastic, and the tag is embedded between the layers of plastic. RFID tags come in a variety of shapes and sizes and are either passive or active. Passive tags are the most widely used, as they are smaller and less expensive to implement. Passive tags must be "powered up" by the RFID reader before they can transmit data. Unlike passive tags, active RFID tags have an onboard power supply (e.g., a battery), thereby enabling them to transmit data at all times. For a more detailed discussion, refer to this article: Passive RFID Tags vs. Active RFID Tags.

Q10: Explain how Wearable Computing can be employed in computer gaming?

Ans: The terms "wearable technology", "wearable devices", and "wearables" all refer to electronic technologies or computers that are incorporated into items of clothing and accessories which can comfortably be worn on the body. These wearable devices can perform many of the same computing tasks as mobile phones and laptop computers; however, in some cases, wearable technology can outperform these hand-held devices entirely. Wearable technology tends to be more sophisticated than hand-held technology on the market today because it can provide sensory and scanning features not typically seen in mobile and laptop devices, such as biofeedback and tracking of physiological function

Q11: **What kind of facilities and technologies must be present in order to call you own home a Smart Home?**

Ans: App Based: App-based Smart-Home technology uses your home network to communicate with the Cloud. Cloud technology is a vital part of the Internet of Things, and both have grown very popular in the last few years. Most app based smart devices work by connecting your Home-Automation devices to your home network via Wi-Fi. Those devices connect to a severer somewhere, which you then access through apps on your smart device.

Once you have created a personalized account with these apps you can coordinate with your Smart Home devices. This way the company knows which device goes with which app user. As long you and your smart home devices are connected to the Internet, you can communicate back and forth with most of these cloud-based Home-Automation devices from anywhere.

Some app-based home automation technology connects to your smart device directly through Bluetooth. Like cloud-based home-automation, you still need to create a personal account on the app. Unlike cloud-based apps though, you need to be in the vicinity of these home-automation devices for them to work.

Smart Homes

Technology has been growing at insane speed, and it isn't slowing down. Things we once only saw in science fiction are now a reality. You can call people from your watch like James Bond, talk to your computer like Hal 9000 (though hopefully not just like Hal) and now you can have a smart home like Iron Man.

Smart home technology has actually been around for a few years. Bill Gates started building his smart home in 1988 and finished in 2005. Today, you don't have to be a billionaire to own a smart home, and it certainly won't take 17 years to construct. Whether you want to run your home through a central system, or are happy with app-based devices your options are very broad, and just keep widening.