

CHAPTER 1 FUTURE TECHNOLOGIES IN TELECOMMUNICATION SYSTEMS

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1.1 INTRODUCTION

There are many emerging technologies in telecommunication systems to cater to the needs of next-generation applications. The objective of this book is to provide a unified view of the broad field of communication engineering. It is also intended to suggest improvements to the current telecommunications systems. Some of the chapters in this book also demonstrate adoption of the next generation telecommunication network and wireless communication system in various scenarios.

Telecommunications revolutionised the world by allowing for distance communication. It creates new opportunities such as online learning, online ecommerce, facilitating communication with people anywhere. Figure 1.1 shows the telecommunication trends that will impact the businesses and everyday practices around us. This includes fifth-generation (5G) technologies, internet of things (IoT), artificial intelligence (AI) and cloud computing (Sigov et al., 2022).

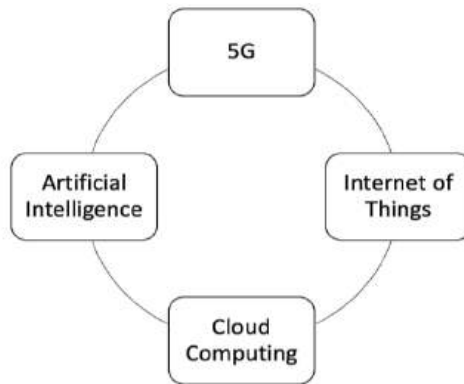


Figure 1.1 Telecommunication industry trend impacting the future

Fifth-generation (5G) cellular networks are currently the mainstream of wireless technology, being able to provide low latency, high capacity and increased bandwidth compared to fourth-generation (4G) technologies. The IoT will continue to grow due to the advancement of 5G technologies. Cellular network's IoT devices can leverage wide wireless connectivity coverage to allow remote access to data centres. This would enable end-to-end massive IoT infrastructure to serve its desired purposes. AI is the field of making machines smarter so that they can predict how they will be used and how people will act when the equipment is in use. This reduces risk and makes decisions better (Trocin et al., 2021). Even though cloud computing is not a new trend since telecommunication relies a lot on the cloud infrastructure, this technology is beginning to be implemented more intensively and extensively to exploit its benefits.

This chapter is organised by firstly presenting recent technologies in the next generation telecommunication system. Section 1.2. discusses on radio access network (RAN) base station technologies. Section 1.3 delves into network core technologies for the next generation telecommunication system. After establishing the basic of these technologies, ensuing elaborations of the whole book is outlined in section 1.4. Finally, section 1.5 provides the conclusions drawn from this chapter's write up.

1.2 RADIO ACCESS NETWORK BASE STATION TECHNOLOGIES

A radio access network (RAN) base station is a mobile network infrastructure that consists of antennas and different radio units. A RAN wirelessly connects mobile user equipment (UE) to the core network. More specifically, RAN operation involves transmission as well as reception of data in diverse formats through radio links. Upon receiving data, RAN transceivers will process it in suitable form for subsequent core network transmission. Data from the core network can be sent to the internet. On the other hand, similar complex processes are used to transmit data from the internet to the UE. The basic elements of any RAN base station infrastructure as shown in Figure 1.2 include:

- (1) Remote radio head (RRH): That handles emission and reception of wireless signal (Tong et al., 2019).
- (2) Common public radio interface (CPRI): A fibre optic link with large bandwidth for high data traffic (Andersson, 2020).
- (3) Baseband unit (BBU): Operates complex digital signal processing (Tong et al., 2019).

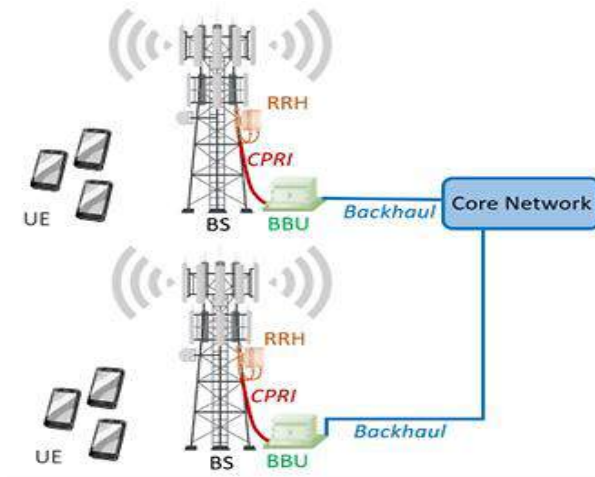


Figure 1.2 Radio access network infrastructure connection to the core network