



# **BACHELOR OF COMPUTER APPLICATIONS**

## **SEMESTER 5**

**DCA3143**

**E-COMMERCE**

# Unit 12

## Wireless Application Protocol

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## 1. INTRODUCTION

The growth of wireless applications has been very beneficial for businesses and individuals. It has gained significant revenue in the last few years and has brought substantial progress in the development of websites and other digital applications. The Wireless Application Protocol (WAP) enabled technology is equipped with Bluetooth technology that offers facilities like email, fax, and use of mobile phones to facilitate business transactions.

WAP is a very flexible and standard technology that includes most wireless networks, which comprise CDPD (Cellular Digital Packet Data), CDMA (Code-division multiple access), GSM (Global System for Mobile Communications), PDC (Personal Digital Cellular), Mobitex (wireless packet data network), GRPS (General Packet Radio System), and more. It is supported by most operating systems and was specifically engineered for mobile stations, including Palm OS, EPOC, Windows CE, OS/9, and Java OS.

Lately, the e-commerce industry has been taken over by Wireless Application Protocol or mobile commerce. Due to its universality and ease of use, mobile commerce has a wider scope than that e-commerce. Several business enterprises have adopted m-commerce to reach customers and communicate with other business partners. The communication and transaction modes over wireless mobile devices are much faster and cheaper. Mobile commerce facilitates many forms of technologies like mobile scan, infrared, SMS, contactless chip, and interactive voice response.

This unit explains the concept of Wireless Application Protocol. It explains in detail the architecture and working of WAP. Further, the unit details WAP and mobile apps. Later, the unit describes the role of mobile apps in e-commerce.

### 1.1 Learning objectives

*By the end of this unit, you will be able to:*

- ❖ *Explain the WAP*
- ❖ *Describe WAP and mobile apps*
- ❖ *Discuss the role of mobile apps in e-commerce*

## 2. UNDERSTANDING THE WIRELESS APPLICATION PROTOCOL (WAP)

Wireless Application Protocol (WAP) is a requirement for a set of communication protocols needed for Internet access for using wireless devices like mobile phones and radio transceivers. It can be used for instant messaging, receiving emails, browsing the web, etc. WAP was framed by Ericsson, Motorola, Nokia, and Unwired Planet in 1997–1998 during the WAP Forum. The wireless model was accepted all over the world and it was used for working on several wireless systems like mobiles, pagers, printers, etc.

The Wireless Application Protocol (WAP) is an open global specification protocol designed for micro-browsers that enables access to the Internet in mobile devices. It consists of a protocol stack to facilitate the exchange of information between the software, WAP-enabled web browsers, network technologies, and wireless devices. Further, the protocol helps with standardizing access to mobile data and doing away with the various limitations associated with networks and wireless devices. This is possible as WAP supported the various Internet protocols, XML, and different User Datagram Packets. The WAP protocol supports low-bandwidth and high-latency mobile networks, and the format of Wireless Markup Language (WML) allows webpages to be displayed without limitations on the user's mobile hardware.

WAP is built on top of existing network protocols like the Internet Protocol (IP) and Transmission Control Protocol (TCP). IP provides a network routing service for upper-layer protocols like TCP, which transports data reliably between two ends of a network connection. This reliability of data delivery is important for the success of transactions in mobile commerce systems and the wireless environment. The Internet Protocol and TCP require significant modification to adapt to features like mobility and radio communication. The technology applied by WAP is the WAP gateway that translates requests from the WAP protocol to the WWW, so they can be submitted to web servers. The concept of WAP and its backend functioning is like the World Wide Web (WWW) and uses the markup language, Wireless Markup Language (WML), for accessing the WAP services and creating web applications for wireless devices like mobiles.

The importance of WAP technology is discussed as follows:

- It is very convenient, secure, and cost-efficient.

- It is easier to set up compared to setting up a wired network.
- It has less complications to add new users to the network.
- It is accessible without any problem.
- It provides more flexibility to users to stay online even when moving from one area in the office to another.
- Guest users can have Internet access by using a password.
- Wireless network protection can be set up even if the network is visible to the public by configuring maximum wireless security.
- Network resources and assets can be protected by creating Virtual Local Area Networks (VLANs).

## 2.1. Architecture and Working of Wireless Application Protocol

WAP technology was introduced to improve the existing technology of wireless data services, by launching newer mobile applications without having to change the wireless devices or the infrastructure. It has greatly benefited mobile users by providing them secure and easy access to online services in form of messaging, banking transactions, entertainment, etc.

The WAP model has three levels: the client, gateway, and origin server. The WAP protocol depends majorly on the gateway since the gateway acts as the mediator between the Internet and wireless devices.

The WAP protocol architecture consists of four layers for different forms of data transmission and communication. They are as follows:

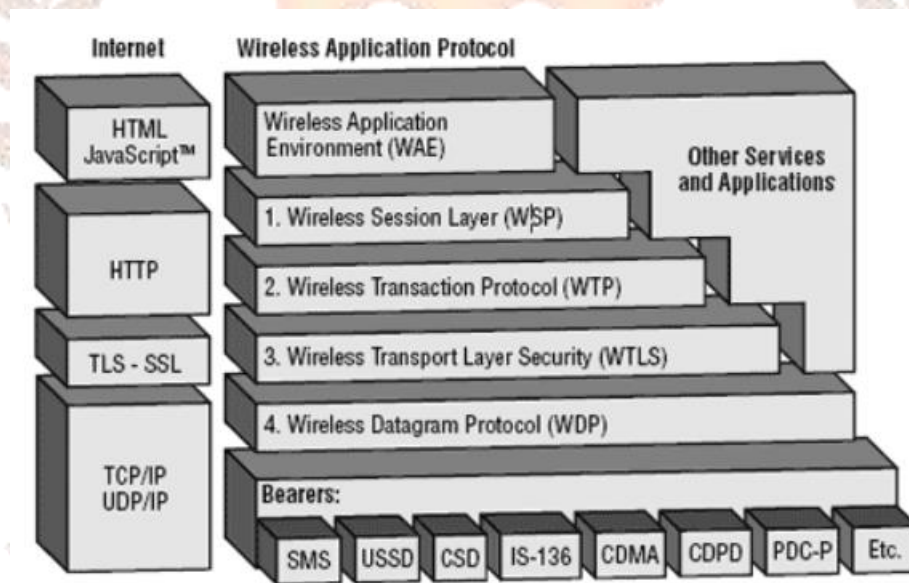
- **Application Layer:** It consists of specifications of the mobile device, and content development programming languages, like the WML and WML script. Wireless application environment (WAE) is an important part of this layer.
- **Session Layer:** The layer consists of the Wireless Session Protocol (WSP). It provides faster connection suspension and reconnection.
- **Transaction Layer:** It runs on top of UDP (User Datagram Protocol), which is the datagram service and it is a part of the TCP/IP protocol that is required for offering



support for transactions that are effective for lower bandwidth wireless systems. The Wireless Transaction Protocol (WTP) is part of this layer.

- **Security Layer:** It takes care of data integrity, privacy, and authentication that is required for Transport Layer Security (TLS) protocol standards. The Wireless Transaction Layer Security (WTLS) is part of this layer.
- **Transport Layer:** This layer consists of the Wireless Datagram Protocol (WDP). The WDP displays a data format that is consistent with the higher layers of the WAP protocol.

The above-mentioned layers provide the users with a proper interface with the above layers and the working of each layer is transparent to the layers above it. Fig. 12.1 shows the architecture of WAP:



**Figure 12.1: WAP Architecture**

The working of WAP technology can be explained in the following manner:

1. The requests from mobile stations are sent as a URL through the network to the WAP gateway.
2. The responses are sent from the webserver to the WAP gateway in HTML, translated to WML (Wireless Markup Language), and sent to the mobile stations.

3. The WAP gateway consists of an encoder that uses the WML compiler to convert the WML data into binary format. It has an adapter that provides additional information through the HTTP header.
4. Though WAP supports HTML and XML, its host language is WML (Wireless Mark-up Language), it is a mark-up language based on XML that is used for specific content and user interfaces for mobile stations.
5. WAP uses WML script to run simple code on the client-server, which is similar to JavaScript but makes minimal demands on memory and CPU power.

### SELF-ASSESSMENT QUESTIONS - 1

1. \_\_\_\_\_ is an open global specification protocol designed for micro-browsers that enables access to the Internet on mobile devices.
  - a. Cellular Digital Packet Data
  - b. Global System for Mobile Communications
  - c. Wireless Application Protocol
  - d. Wireless Packet Data Network
2. WAP supports various Internet protocols, XML, and different User Datagram Packets. (True/False)
3. Name the three levels of the WAP model.
4. Security layer consists of the Wireless Datagram Protocol (WDP). (True/False)
5. The requests from mobile stations are sent as a \_\_\_\_\_ through the network to the WAP gateway.

### 3. WAP AND MOBILE APPS

As studied earlier, WAP is the Wireless Application Protocol that provides the standard for a set of communication protocols for various wireless devices. It helps with bridging the gap between the mobile world and the Internet by providing an unlimited form of mobile value-added services for users. The services can be accessed from a wide variety of mobile devices without the users having to download any program to their mobile devices. They only require a mobile browser, a standard feature available with several latest mobile phones, and an Internet connection for accessing the web.

WAP works in an open application environment and it can be built on any operating system. The Wireless Application Protocol (WAP) gateway acts as the server and the software system that help with encoding and decoding the requests and responses of the user. The gateway helps the WAP-enabled wireless devices to communicate with the applications and websites on the Internet. WML (Wireless Markup Language) is the language used for delivering web pages in a special format, which is put together and forwarded through the WAP gateway.

Mobile apps (mobile applications) are software applications created to run and work on a mobile device or tablet computer and not on PCs or laptops. They provide users with services that are similar to those accessed on PCs. These apps are smaller independent software units with limited functions made popular for smartphones, iPads, and iPods. Mobile apps are created and updated based on the limitations of mobile devices.

Earlier, mobile apps were used for managing and scheduling emails and calendars, retrieving contacts, etc. Seeing their immense popularity, the apps were created for a large range of other categories, like entertainment, games, social networking, etc. Such apps were popularly used on Android and iOS (Apple) operating systems. The mobile apps are categorized based on their technology of coding, users, business goals cost, and time. These are as follows:

- **Native Apps:** These are mobile apps that are made for certain operating systems and can be downloaded only on the specific operating systems.
- **Web Apps:** These are web-based applications that run through web browsers. Web apps are made for several wireless devices irrespective of the operating systems.



- **Hybrid Apps:** These are a combination of native apps and web apps and are designed for the mobile operating system. Hybrid apps are found in the native systems and they can be downloaded and installed on all types of mobile devices.

### 3.1. Role of Mobile Apps in E-Commerce

The universality and ease of use have made mobile apps play a significant role in e-commerce. Mobile apps are considered the driving force of the next generation due to the rapid increase of mobile devices like mobile phones, iPhones, handheld computers, and PDAs (personal digital assistants). Mobile apps facilitate various forms of technologies like mobile scan, infrared, SMS, contactless chip, and interactive voice response. The use of mobile devices has increased across the globe due to their availability and ease of use. The advent of mobile apps has enabled the availability of information. They have also created many opportunities for businesses to grow. Users can access shopping platforms with the help of mobile apps.

Mobile apps have helped businesses expand their customer base and do away with the need to physically go to shops or stores. They have helped consumers to get all the information they require about the variety of products and prices. They are beneficial for the suppliers for promoting and marketing new products. One of the important advantages of shopping through mobile apps is that they are open 24/7 and do not need people to take care of the stores and protect the goods. One can access the e-commerce sites at any time of the day or night for buying items without physically going out to any location. Other important advantages of using mobile apps in e-commerce are as follows:

- Provides a wide reach and convenience
- Increases brand recognition
- Ensures product and service localization
- Establishes personal touch with improved customer experience
- Increases loyal customer base
- Does not require skilled consumers
- Enhanced market communication
- Enhances ubiquity and improves conversion rate

- Easy to use with instant connectivity

### Activity I

Research the Internet and prepare a report on the latest developments in the field of mobile apps and e-commerce in recent years.

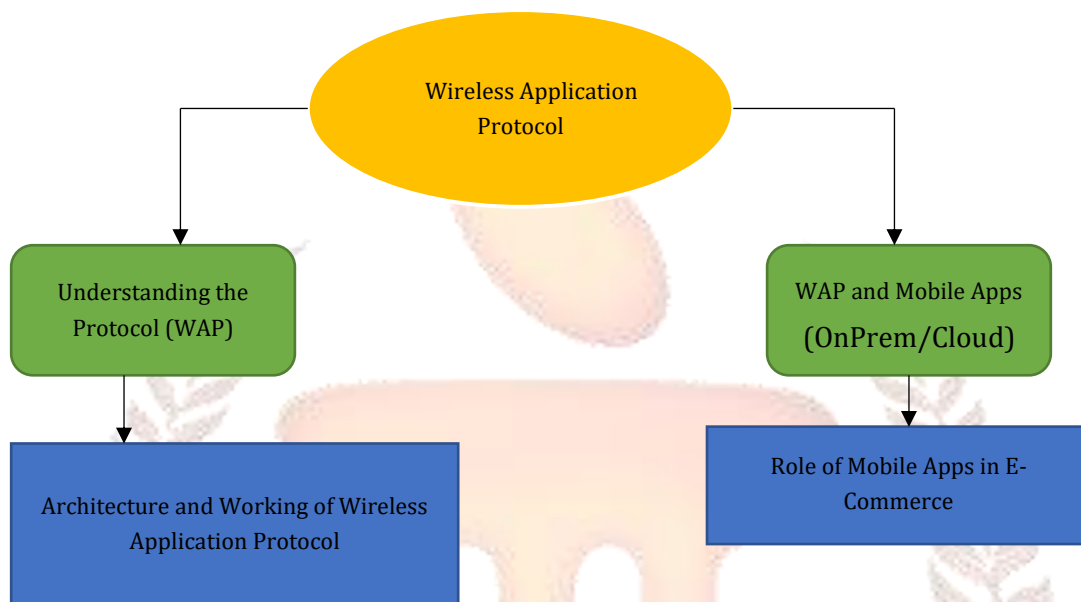
### SELF-ASSESSMENT QUESTIONS - 2

6. The advent of the \_\_\_\_\_ has enabled the availability of information and it has created many opportunities for businesses to grow.
7. Mobile apps are created and updated based on the limitations of mobile devices. (True/False)
8. \_\_\_\_\_ are mobile apps that are made for certain operating systems.
9. The use of mobile devices has increased across the globe due to their availability and ease of use. (True/False)
10. Mobile apps do not allow suppliers to promote and market new products. (True/False)

### STUDY NOTE

ICICI Bank and many other banks have launched the facility of iMobile that allows customers to carry out all Internet banking transactions through mobile phones. Customers can transfer funds to ICICI and non-ICICI Bank accounts with the help of their mobile. The customers can avail facilities, like requesting a checkbook, stopping payment of a cheque, paying utility bills, and ascertaining transaction details and payment due dates through mobile phones.

## 4. CONCEPT MAP



**Fig. 12.2: Concept Map**

## 5. SUMMARY

- The Wireless Application Protocol (WAP) is an open global specification protocol designed for micro-browsers that enables access to the Internet in mobile devices.
- WAP consists of a protocol stack that is created to facilitate the exchange of information between the software, WAP-enabled web browsers, network technologies, and wireless devices.
- WAP is built on top of existing network protocols like the Internet Protocol (IP) and Transmission Control Protocol (TCP).
- The WAP model has three levels: the client, gateway, and origin server. The WAP protocol architecture consists of four layers for different forms of data transmission and communication. These are the application layer, session layer, transaction layer, security layer, and transport layer.
- Mobile apps (mobile applications) are software applications created to run and work on a mobile device or tablet computer and not on PCs or laptops.

## 6. GLOSSARY

- **Wireless Application Protocol (WAP):** An open global specification protocol designed for micro-browsers that enables access to the Internet by the mobile devices.
- **WAP Gateway:** The technology that translates requests from the WAP protocol to the WWW, so they can be submitted to web servers.
- **Wireless Application Environment (WAE):** An important part of the application layer consisting of specifications of the mobile device, and content development programming languages, like the WML and WML script.
- **Mobile Apps:** Software applications created to run and work on a mobile device or tablet computer and not on PCs or laptops.



## 7. TERMINAL QUESTIONS

### Short Answer Questions

1. What is WAP?
2. Explain the transaction layer of WAP architecture.
3. Explain the categorization of mobile apps.

### Long Answer Questions

1. Explain the importance of the WAP technology.
2. Discuss the architecture of the WAP protocol.
3. What are mobile apps? Explain their importance.



## 8. CASE STUDY: MOBILE APP DEVELOPMENT AT MAPLES FOOD

Maples food is an Indian company known for offering superior quality food products, including both frozen and fresh, imported and exotic food items all in one place. The aim of the company was to develop an e-commerce store with easy and convenient payment options for the customers in Baroda.

Due to the e-commerce nature of this site, the company needed to develop an online store in WooCommerce. The platform provided all the necessary features to support the features requested. It also offered the adequate features to enable efficient handling of shopping carts, payment options, and a myriad of products that appeal to a global customer base. The product assortment was diverse and mostly unique products were imported. As the store was operational only in Baroda, the company desired to have a mobile application to allow mobile customers to place orders easily with fewer clicks.

The company decided to work with Elinsys to develop its app. Elinsys created a marketplace to enable Maples Foods easily upload their products online. Further, customers were also allowed to place their orders and purchase online. Product addition, removal, or editing was made simple.

Elinsys also ensured that customers get the best quality gourmet and frozen food and a selection from a vast range of imported cheese, processed foods, exotic vegetables, and ready-to-eat vegetarian as well as non-vegetarian food items. Following are the features incorporated into the mobile:

- Development in WooCommerce.
- High-quality graphics and images to provide greater aesthetic appeal.
- Clutter-free and clear design
- Easy to browse categories and products allowing customers to conveniently locate their favorite products.
- Incorporation of features for usability, such as easy navigation, quick payments, and checkouts.
- Integration of payment gateway (Razorpay was used).

- Provision of cash on delivery (COD) option.
- Availability of mobile application for both Android and iOS.
- Ease of order placement in few taps and swipes from the phone itself.
- Enriching overall shopping experience for customers

In 2 months, the e-commerce website was ready and made live for customers to place orders for imported food and exotic ingredients. The combination of website and mobile application together allowed customers to make instant purchases of their favorite—ready-to-cook food. The ease of navigation and payment options provided better customer experience with the store. The new design of the website was enticing and the website achieved a substantial increase in selling quality products.

Source: <https://www.elinsys.com/case-study/maples-foods/>

#### Questions

1. Discuss the features that were developed in the mobile app of Maples food.

**Hint:** The app was developed in WooCommerce and had high-quality graphics and images.

2. Discuss the aims of Maples food for developing the mobile app. Did the company succeed in achieving its aims?

**Hint:** The company wanted to develop an e-commerce store with easy and convenient payment options for the customers in Baroda.

## 9. ANSWERS

### Self-Assessment Questions

1. Wireless Application Protocol
2. True
3. Client, gateway, and origin server
4. False
5. URL
6. Mobile apps
7. True
8. Native apps
9. True
10. False

### Short Answer Questions

1. Wireless Application Protocol (WAP) is a requirement for a set of communication protocols needed for Internet access for using wireless devices like mobile phones and radio transceivers.

For more details, refer to section 12.2.

2. The transaction layer consists of Wireless Transaction Protocol (WTP) and runs on top of UDP (User Datagram Protocol).

For more details, refer to section 12.2.

3. The mobile apps are categorized based on their technology of coding, users, business goals cost, and time.

For more details, refer to section 12.3.

### Long Answer Questions

1. WAP technology provides more flexibility to users to stay online even when moving from one area in the office to another.

For more details, refer to section 12.2.

2. The WAP protocol architecture consists of four layers for different forms of data transmission and communication.

For more details, refer to section 12.2.

3. Mobile apps (mobile applications) are software applications created to run and work on a mobile device or tablet computer and not on PCs or laptops.

For more details, refer to section 12.3.





## 10. SUGGESTED E-REFERENCES AND E-BOOKS

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