

MOBILE CLOUD COMPUTING

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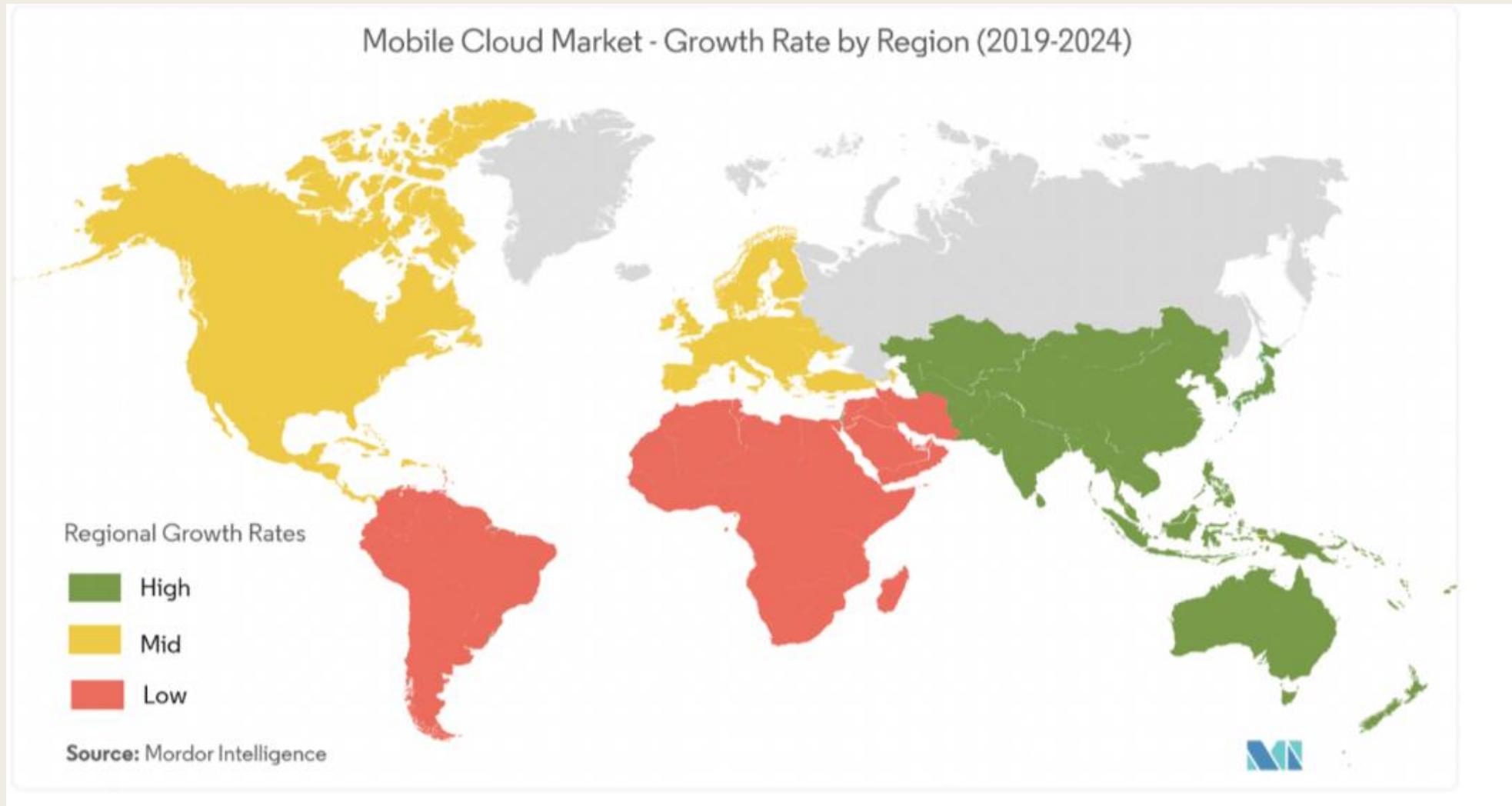
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What is mobile cloud computing?

- Mobile cloud computing uses cloud computing to deliver applications to mobiles.
- The mobile cloud refers to **cloud-based data and the applications and services** designed for mobile devices.
- It combines mobile application development with cloud-based services, making the delivery of cloud services and apps to mobile users possible.

Mobile Cloud Market



Source: [Mordor Intelligence](#)

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- A custom mobile cloud app is a software program where cloud-based and local components work together in harmony. Remote data centers store data and the apps operate from there. Cloud-based mobile apps need an internet connection to function.
- Computations run on the cloud, and data is stored on the cloud. That allows apps to run on more devices because the device itself isn't using up precious resources.

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- With MCC, building (and updating) mobile cloud apps use cloud services. Once that's done, **the apps deploy remotely to mobile devices.**
- These mobile devices may have different operating systems and data storage.
- MCC allows users to access applications they may not otherwise have been able to, because of device limitations such as storage.

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- MCC offers **rich computational resources to mobile users**, mobile network operators, and cloud computing providers.
- The combination of cloud computing, mobile computing, and wireless networks makes it possible for the execution of rich mobile applications across different mobile devices.

What's the difference between cloud computing and mobile computing?

- Cloud computing is **the delivery of computing services over the internet**. That includes storage, databases, software, and analytics. It's a pay-as-you-go service that's cost-effective and scalable.
- Mobile computing **allows you to access data and information wherever you are**. Mobile computing transports data, voice, and video over a network using a mobile device.



Mobile computing used to be a more or less consumer-facing service. These days, organizations are integrating their business applications and processes with mobile systems. That allows employees to work from anywhere and on the go, saving time and money.

General-purpose vs application-specific MCC solutions

- There are multiple methods and techniques for mobile cloud computing. These include general-purpose mobile cloud computing solutions and application-specific solutions.

General-purpose MCC solutions (GPMCC)

- GPMCC solutions are general systems for using the cloud to help boost phone performance. These systems help alleviate the limited computational power of mobile devices.
- They **outsource tasks to the cloud** that are usually performed locally on a mobile device. For example, intensive tasks like speech recognition or video indexing, and background augmentation.

Application-specific MCC solutions (ASMCC)

- Many applications used on a mobile device utilize cloud computing, and there are multiple ways to leverage the cloud. These methods are application-specific cloud computing solutions. ASMCC involves **developing specific applications for mobile devices** that use cloud computing.
- Both GPMCC and ASMCC allow a mobile device to perform intensive operations, but ASMCC also has an added benefit. It allows for cloud computing uses that require more than increasing computational power. For example, chat or email clients use ASMCC.

Mobile cloud computing applications

A mobile cloud app is a software program **designed to be accessible via the internet through portable devices**. In terms of the real world, there are many examples of mobile cloud solutions, including:

- **Email.** This is a common example that many people use. Gmail, Outlook, and Yahoo Mail are examples of mobile email. When you check your emails via your mobile phone, you're using mobile cloud technology.
- **Social Media.** Be it via Twitter, Instagram, or Facebook, mobile social networking allows real-time data sharing. For example, a mobile user can store data and share videos with other users.
- **Commerce.** Do you use a banking app or e-shop on your mobile? If the answer is yes, you use mobile cloud computing. MCC in mobile commerce uses scalable processing power.
- **Healthcare.** With mobile healthcare, MCC allows massive amounts of instantaneous data storage in the cloud, accessible via a mobile device. For example, it's quick and easy to access patient records on the go.

Why use the mobile cloud?



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Cost-friendly

- There aren't hefty charges with MCC, meaning it's kind to your wallet. You only pay for what you use.

Flexibility

- It's easy to build and update mobile cloud applications using cloud services. What's more, MCC supports **an array of development approaches** and devices. You can make use of MCC regardless of the cloud platform you use.
- Cloud apps function like web-based applications, fetching data by interacting directly with the cloud. That ensures smooth running and a seamless user experience.

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Shared resources

- Mobile applications that run on the cloud use fewer device resources because they're cloud-supported. For example, data-heavy processes can run in the cloud. As a result, **mobile apps aren't constrained by the storage a device has or its processing resources.** With major processing handled by the cloud, battery use reduces.
- Sharing resources in that way to support a variety of apps and many users is multi-tenancy.

Integrated data

- MCC allows users to **collect and integrate data from various sources** quickly and securely, regardless of where the data resides. The integration of cloud computing with mobile is seamless.
- You get real-time data as and when you want, and can save your data in the cloud for when you want to surf offline. Also, you can back your data up to the cloud.

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Data recovery

- With MCC, you can recover critical data from the cloud by following certain processes. Recovery is possible from any location, as long as you're connected to the internet and you have sufficient storage space on your device.

Trends and user demands

- Customers want to access applications from anywhere at any time – they expect convenience. MCC offers just that. Users can work on the go, increasing their productivity.

Technology

- Technologies such as HTML, CSS3, cloudlets, and Web 5.0 are enabling technologies driving the adoption of MCC. Plus, 4G, 5G, and wifi provide users with improved and increased broadband coverage.

Mobile cloud computing service framework

- The framework for mobile cloud computing divides into cloud computing and mobile computing. When we refer to mobile devices, that includes smartphones, laptops, and tablets. These devices connect to the internet via wifi or cellular data technologies.
- The primary concept is cloud computing. Mobile users **send service requests to the cloud**, and then the management component of the cloud allocates resources. At the same time, there's the implementation of calculating and monitoring functions, ensuring quality of service until the connection completes.

Mobile cloud architecture

- MCC refers to a cloud infrastructure where both the data processing and data storage happen outside of the mobile device.
- **Computations execute remotely**, rather than on the mobile device. Mobiles are sometimes limited by the resources they have. Utilizing cloud-based resources remedies that.
- These centralized resources are then accessed over a wireless connection on a mobile device.
- With MCC, there are four types of **cloud-based resources**. These are:
 1. Distant immobile clouds
 2. Proximate immobile computing entities
 3. Proximate mobile computing entities
 4. Hybrid (a combination of 1-3)

An example of the distant immobile category is Amazon EC2. Cloudlets or surrogates are proximate immobile computing entities. Smartphones, tablets, and handheld devices fall under proximate mobile computing entities.

Mobile cloud computing challenges

Performance

- Remote servers host mobile cloud apps, and they're accessed across public networks. That can lead to slower responses and mobile cloud application speed.

Connectivity

- To use a mobile cloud app you need an internet connection. If you're in an area with low connectivity, you'll have trouble using mobile cloud applications. Also, with greater mobile user demands comes **increased mobile data traffic**. That strains communication between mobile and cloud endpoints.

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Vendor lock-in

- It's tricky to [migrate between cloud providers](#) if you're saddled with vendor lock-in. Be sure to check the terms and conditions before committing to a vendor.

Battery life

- High network usage impacts battery life, draining a battery quite quickly at times. Although the cloud handles major processing, devices still need a reasonable battery life to access apps and other operations.

Compatibility

- The infrastructure on the cloud has to support multiple platforms. These may be costly to implement because of different network connection requirements.

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High reliance on network bandwidth

- Applications may work slowly or have limited functionality if there are issues with network connectivity. Although these issues don't happen very often with growing wireless infrastructure, they can still happen..
- Aside from these MCC disadvantages, there are trust, security, and privacy issues, too. The next section looks into these.

Security in mobile cloud computing

- Data security and privacy are big concerns when it comes to MCC. Mobile users often **provide sensitive information through their network** or while using an application. If that information isn't protected, it can lead to serious issues and data breaches.
- When storing data remotely, there's the question of ownership. For example, with audio and video stored remotely rather than locally on your device, who truly owns that data?

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- In terms of privacy, one family of applications, in particular, raises concerns: **location-aware services**. An example is an app that finds nearby restaurants. There's unease that companies will sell or use that information. There are also concerns that the information may pass to government agencies without the user's permission or knowledge.
- Furthermore, if you store your calendar and reminders remotely, what happens if there's provider downtime? You lose access to that data for as long as the service is down.
- Mobile cloud applications need to be adequately secured to mitigate the risks related to user actions. Take care when deciding on a vendor: choose a reliable cloud service provider who will keep your data safe and secure.

Mobile cloud computing (MCC) Summary

- Mobile cloud computing is a **powerful business tool**. It uses cloud computing to deliver services to mobile devices and has many applications. Day-to-day uses include email, social media, and commerce.
- Flexible, budget-friendly, and real-time, MCC offers an array of benefits. It also comes with challenges as well, including security and privacy considerations.
- Regardless, there's no doubt that MCC is here to stay – and grow. For more information on cloud technology and mobile applications, [get in touch](#) with our experienced and expert team.

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