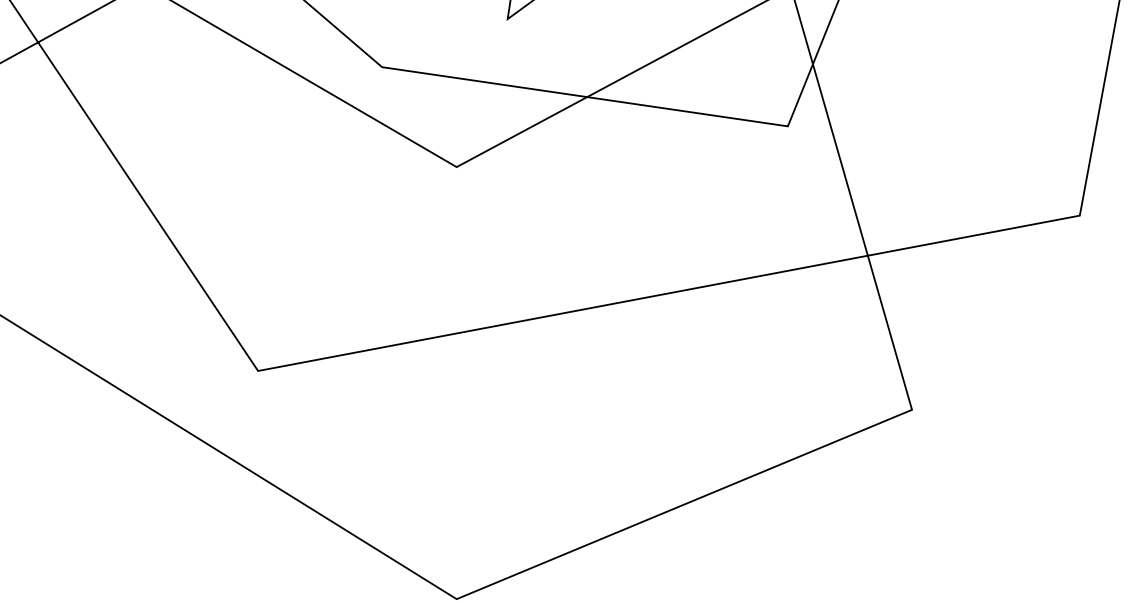

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CHARACTERISTICS AND CHALLENGES OF IOT APPLICATIONS

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CHARACTERISTICS OF IOT APPLICATIONS IN EDGE-CLOUD

In this section, we will explore the defining characteristics of IoT applications operating within the Edge-Cloud computing framework. This model enhances data processing and analysis for the growing number of connected devices.

REAL-TIME PROCESSING

Real-time Processing: IoT applications require real-time processing of data to facilitate time-sensitive tasks such as industrial automation, healthcare monitoring, and autonomous vehicles. The Edge-Cloud architecture enables immediate data analysis, significantly reducing latency and enhancing application responsiveness.

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SCALABILITY

Scalability: Given the vast number of devices generating massive data, scalability is essential. The Edge-Cloud model efficiently distributes data processing across edge devices and cloud infrastructure, accommodating the increasing volume of connected devices and data.

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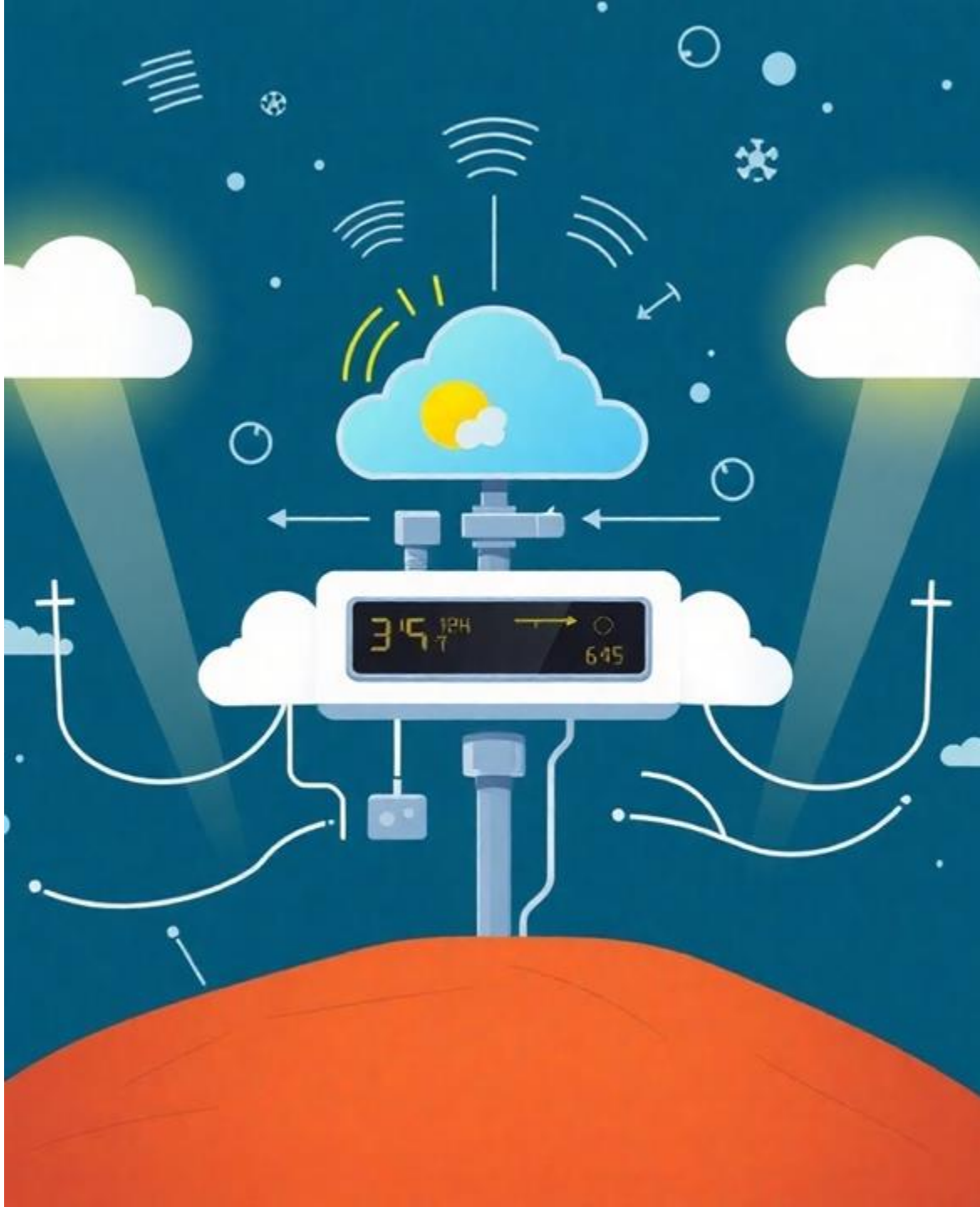
RELIABILITY

Reliability: IoT applications often operate in dynamic environments with unreliable network connectivity. The Edge-Cloud architecture enhances reliability by allowing local data processing and storage, thereby minimising dependency on constant network connections.

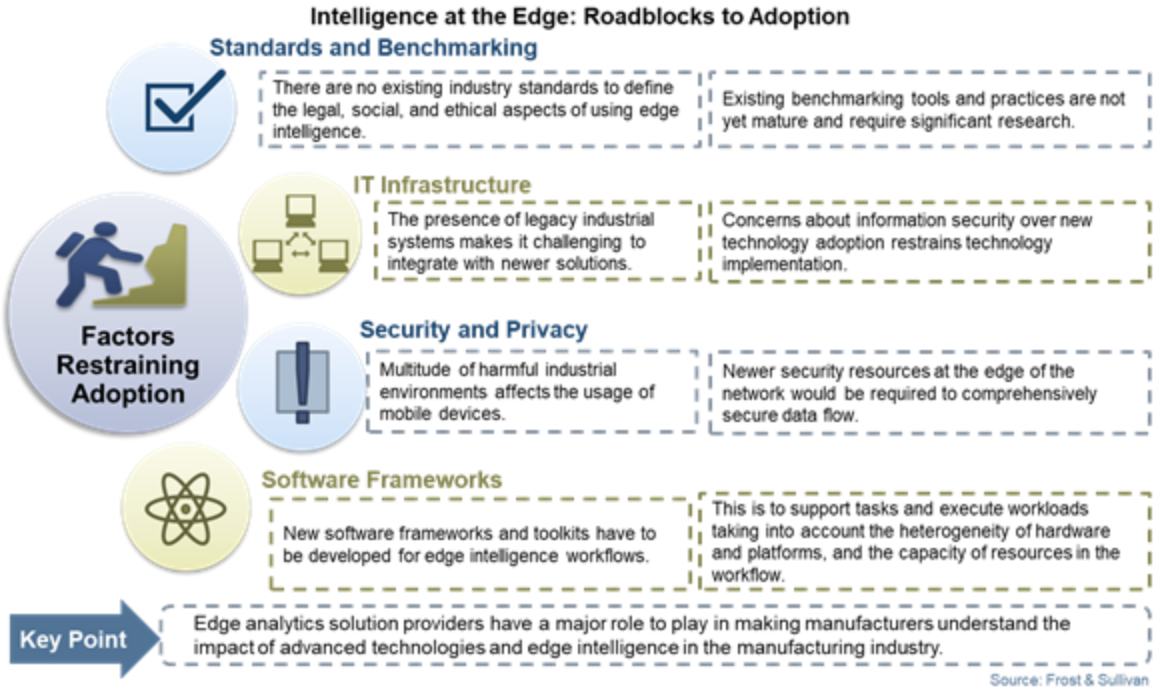


LOW LATENCY COMMUNICATION

Low-latency Communication: Certain applications, like autonomous vehicles or real-time monitoring systems, demand low-latency communication. The Edge-Cloud model facilitates localised data processing, ensuring timely decision-making and improved performance by reducing communication delays.

CHALLENGES OF IOT APPLICATIONS IN EDGE-CLOUD

While the Edge-Cloud model offers numerous benefits, it also presents specific challenges that must be addressed to optimise IoT applications.



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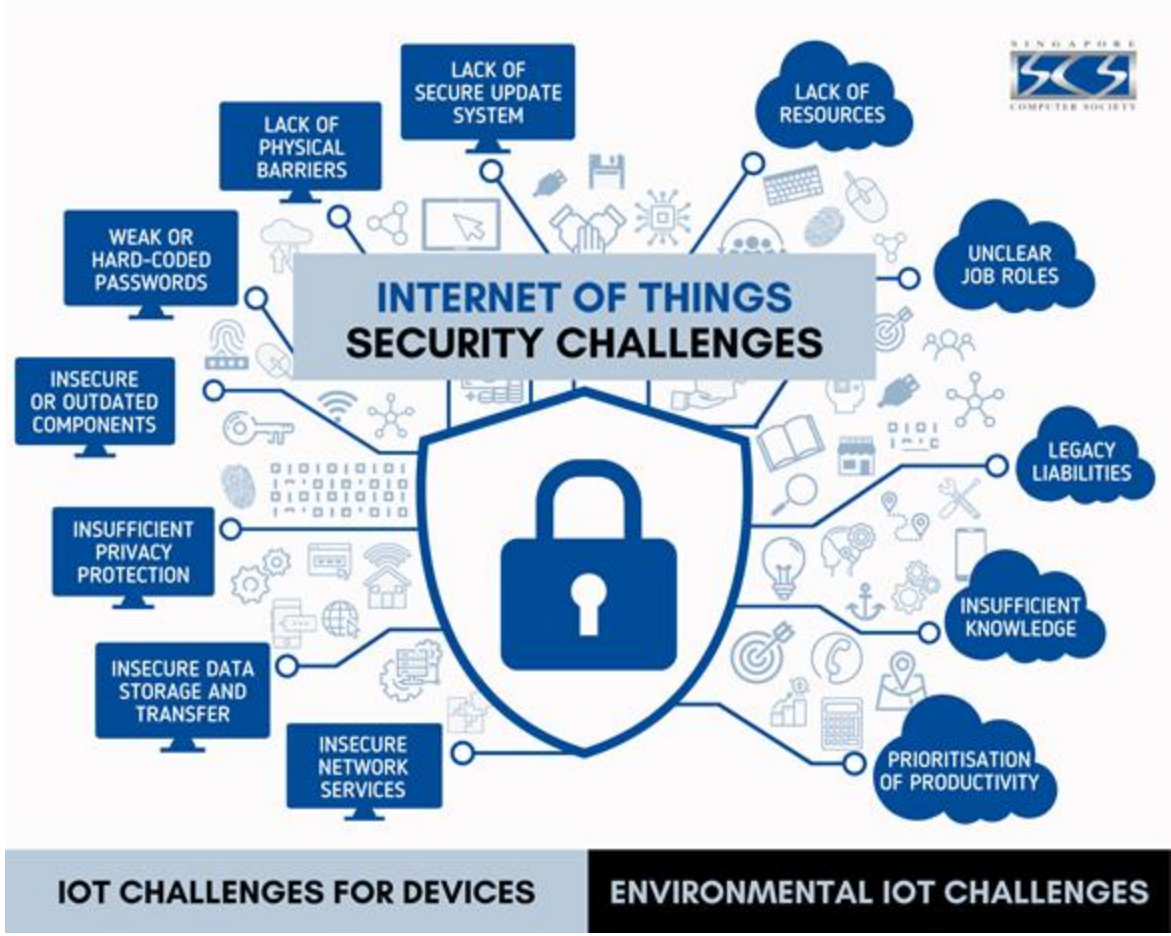
SECURITY AND PRIVACY

Security and Privacy: IoT applications handle sensitive data, making security and privacy paramount. The Edge-Cloud model adds vulnerabilities due to data transfer and processing at edge devices. Implementing robust security measures, such as encryption and access control, is essential to safeguard data.



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RESOURCE MANAGEMENT

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Resource Management: Edge devices are often constrained in terms of computing power, storage, and energy resources. Effective resource management is critical for optimal utilisation and extending battery life. Intelligent resource allocation and load balancing are necessary for efficient workload distribution.

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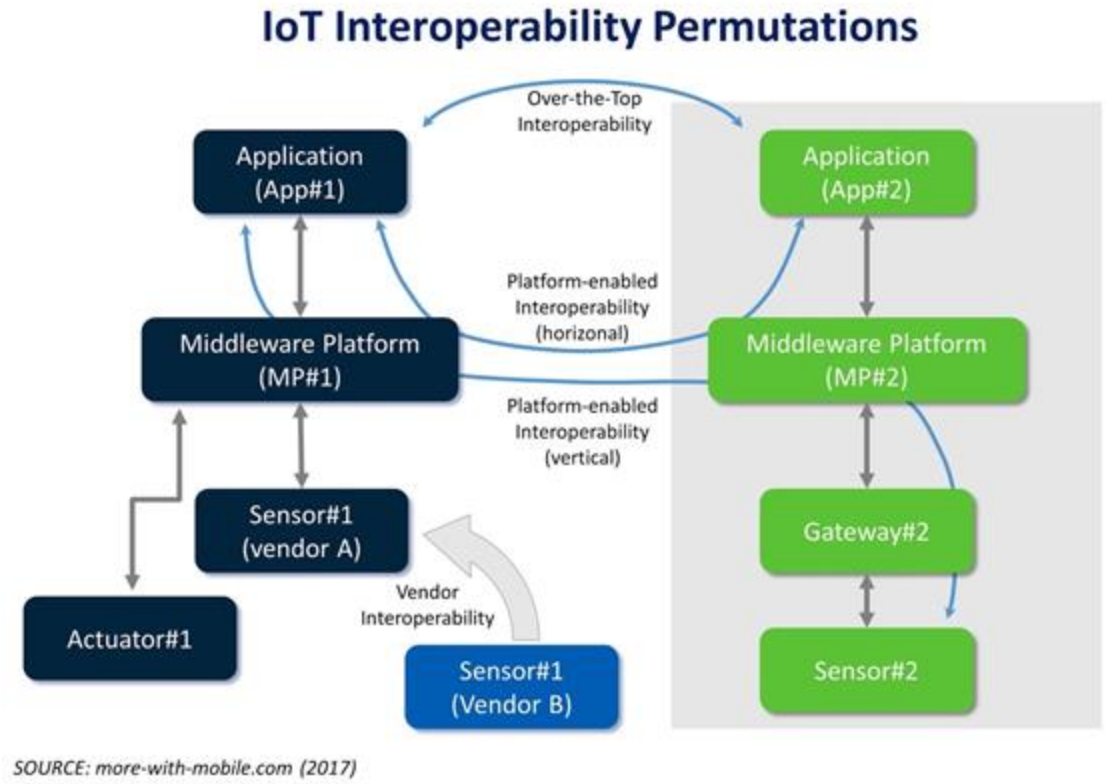
INTEROPERABILITY

Interoperability: With diverse devices and protocols in IoT applications, ensuring interoperability can be challenging. Seamless communication between different devices is crucial, particularly in large deployments. Standardisation efforts, including common communication protocols and data formats, are vital for overcoming interoperability issues.



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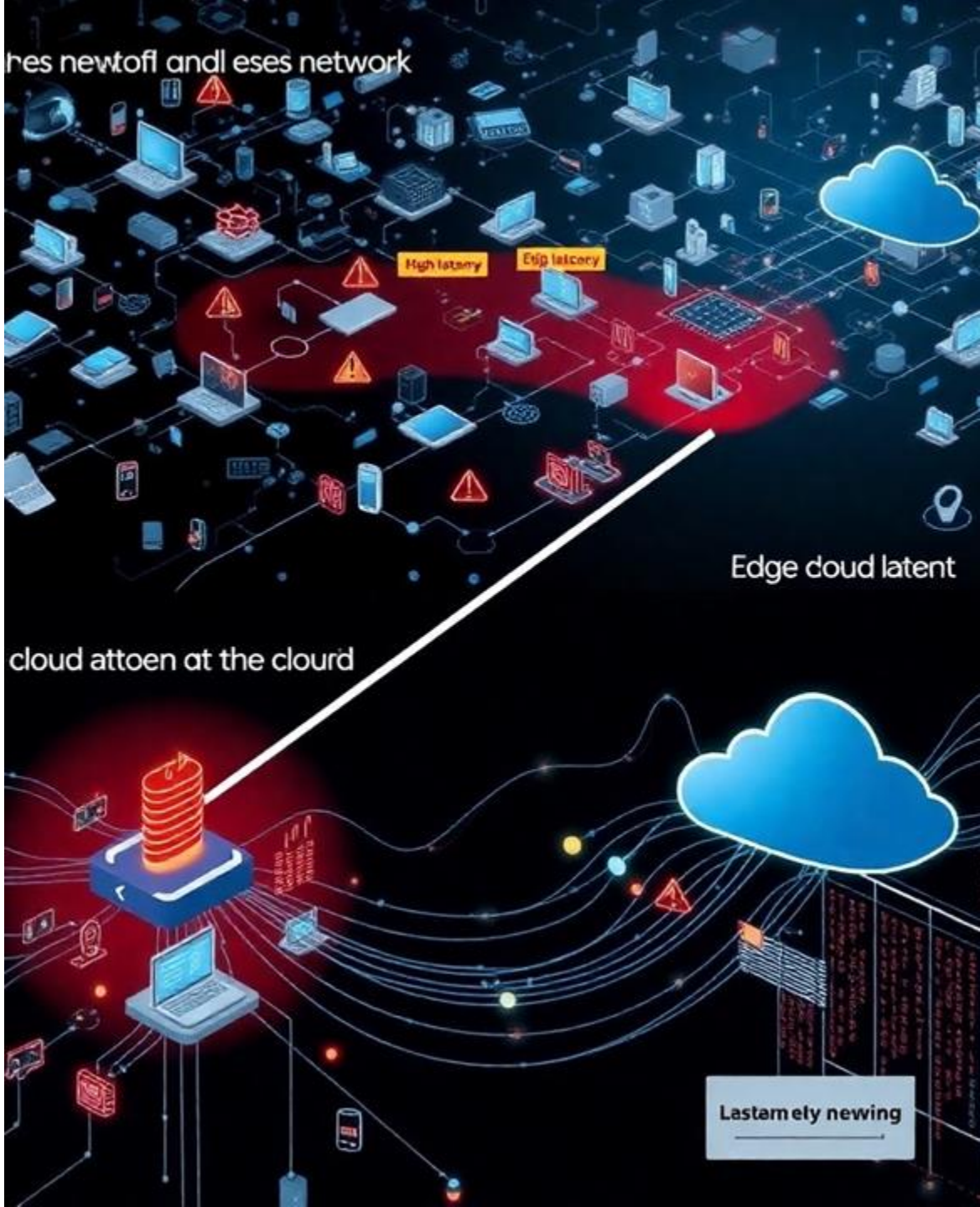
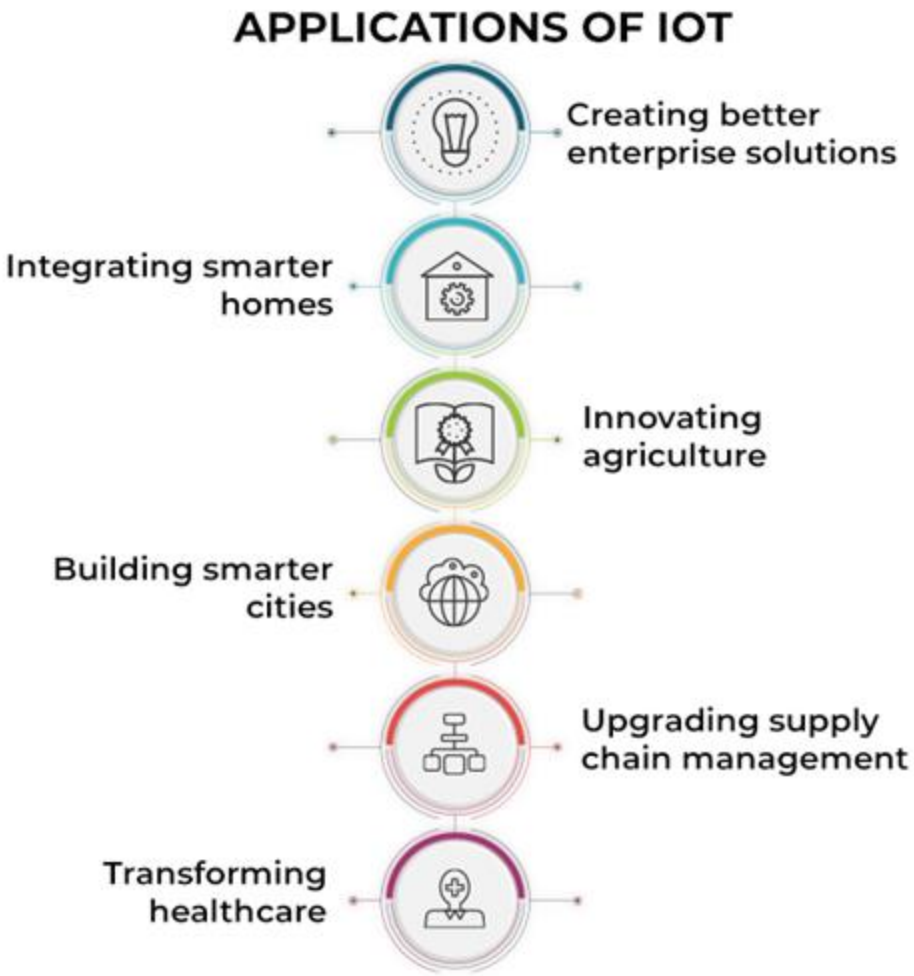
NETWORK CONGESTION

Network Congestion: The high number of connected devices may lead to network congestion, resulting in increased latency and reduced performance. The Edge-Cloud architecture aims to mitigate this by preprocessing data at the edge and only sending relevant information to the cloud. However, careful network planning and optimisation are still required for efficient data transmission.



CONCLUSION

In summary, IoT applications in the Edge-Cloud environment exhibit key characteristics such as **real-time processing**, **scalability**, **reliability**, and **low-latency communication**. However, they also face challenges related to **security and privacy**, **resource management**, **interoperability**, and **network congestion**. Understanding these factors is crucial for developers and architects to design effective Edge-Cloud solutions for IoT applications.



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