January, 2022

Payments Evolution with 5G

Impact of 5G on the way consumers pay

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Why 5G

The next generation of cellular mobile communications technology has arrived. 5G, which is set to succeed the 4G standard over the next few years, offers an exponential improvement in functionality over 4G — it is 100 times faster and has 1,000 times more capacity. Its 3 primary attributes are:

- enhanced Mobile Broadband **(eMBB)**
- Ultra Reliable Low Latency Communications **(URLCC)**
- massive Machine Type Communications **(mMTC)**

The results will be mobile networks that offer far higher capacity and reliability, much lower latency, reduced energy usage, and massive connectivity for devices.

For a consumer, their mobile phone or device will be able to engage with a world that is more instrumented in terms of the number of connected devices sharing data. Digital experiences will be more personalized by processing information about **where they are and what's happening around them.**

5G vs 4G

100x faster

1000x capacity

1/10th latency

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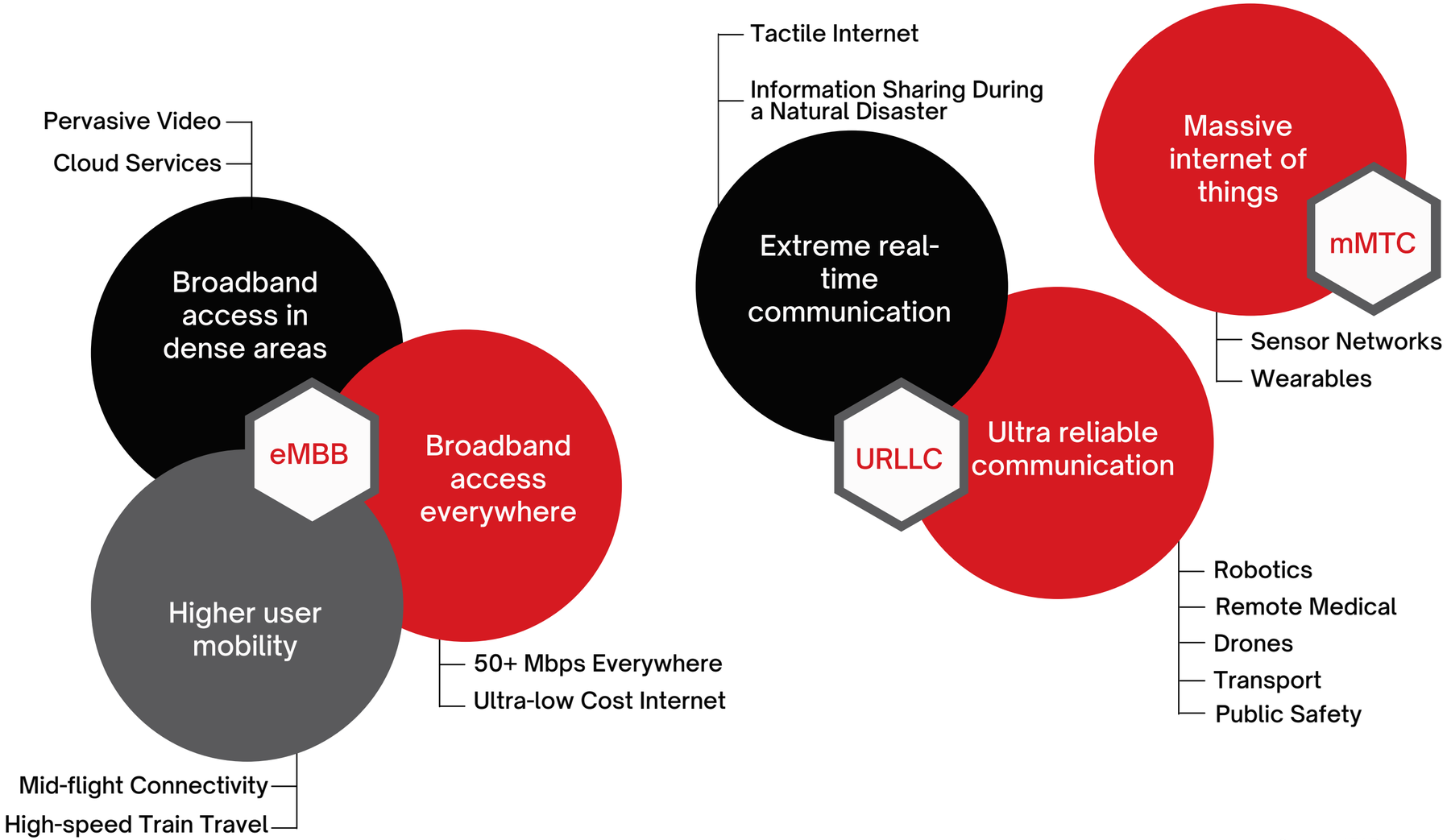
3 Key Changes in 5G

5G comes with 3 key changes compared to 4G - enhanced broadband, reliable communication and machine to machine communication. Several new and existing applications will leverage these key changes to deepen customer engagement.



Source: 451 Research

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Mapping Mobile Network Generations and Payments Evolution

Network	1G	2G	3G	4G	5G
Payments	Voice Enabled telebanking with IVR for fetching limited account details	Text Allowed banks to send SMS/MMS alerts including fraud notifications	Mobile data Internet on phones, enabling access to account through mobile browsers and apps	Cloud, mobile broadband Deeper web capabilities which made banking on apps seamless	Massive data capacity Rise of Machine Customers

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Drivers Fuelling 5G Payments

GROWTH IN DIGITAL PAYMENTS

779 Billion transactions conducted digitally in 2020

Juniper Research

CONNECTED DEVICES TRIPLED

Over last five years to **38.5 Billion** in 2020

Payments Cards & Mobile

INCREASED USE OF AI

Growing computation power and advancement in humanoid technology

SECURITY OF SMART GADGETS

Improved security and data privacy of connected gadgets

NEW MODES OF INTERACTION (AR/VR)

Extended reality creates immersive commerce experiences

OPEN BANKING APIs

API-first development and data sharing between fintechs and banks

IoT payments market is expected to grow to **$410 Billion** by 2023

Juniper Research

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Opportunity for Financial Institutions

Everything is more intelligent today. The world is super connected and the cost of sending information between a device or a sensor and a supercomputer behind the scenes is minimal. Complex services that earlier required manual intervention are now completely digitized. With 5G, the cognitive strain on technology users will be minimal, with optimizations across -

Frontend - *Superapps, immersive banking*
Connected devices will act as remote wallets and give rise to Payment of Things.

Middle-end - *Customer facing operations and support with AI-based automation*
The rise of AI and increasing processing capabilities will enable banks to cater to the market of one, leading to hyper-personalized service experiences.

Backend - *Faster analytics and optimized operations with AI/ML technology*
Banks will be able to process more data for accurate predictive and prescriptive analytics in real-time and automate backend operations.

Let us look at some of the emerging use cases. »

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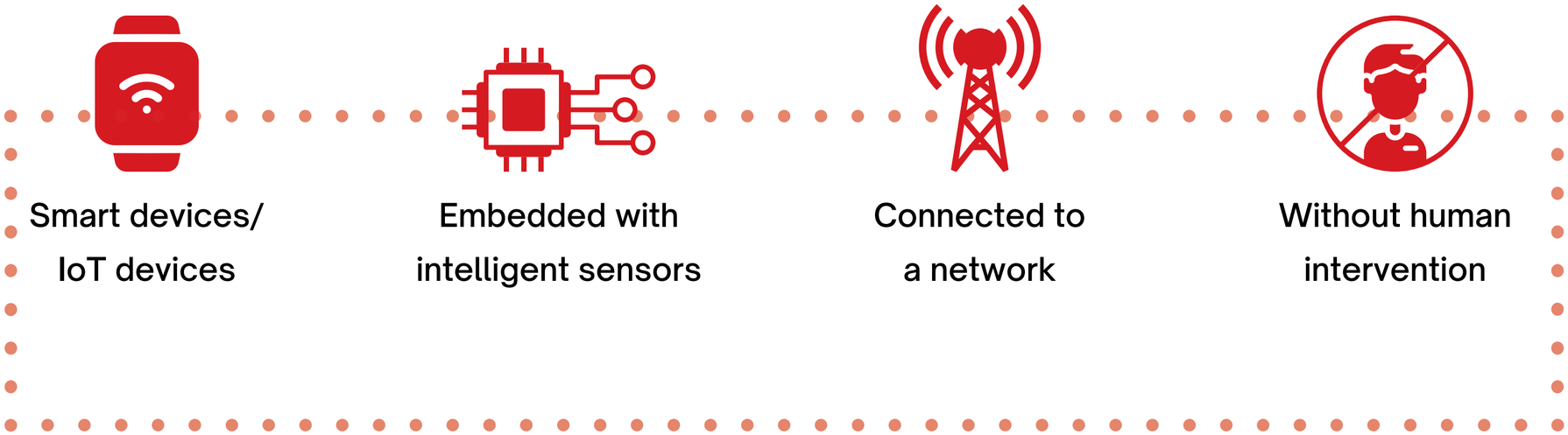
Payment of Things (PoT) is a network of physical objects - devices and appliances - embedded with sensors, software and network connectivity so they can collect and exchange data to perform digital transactions, often without human intervention.



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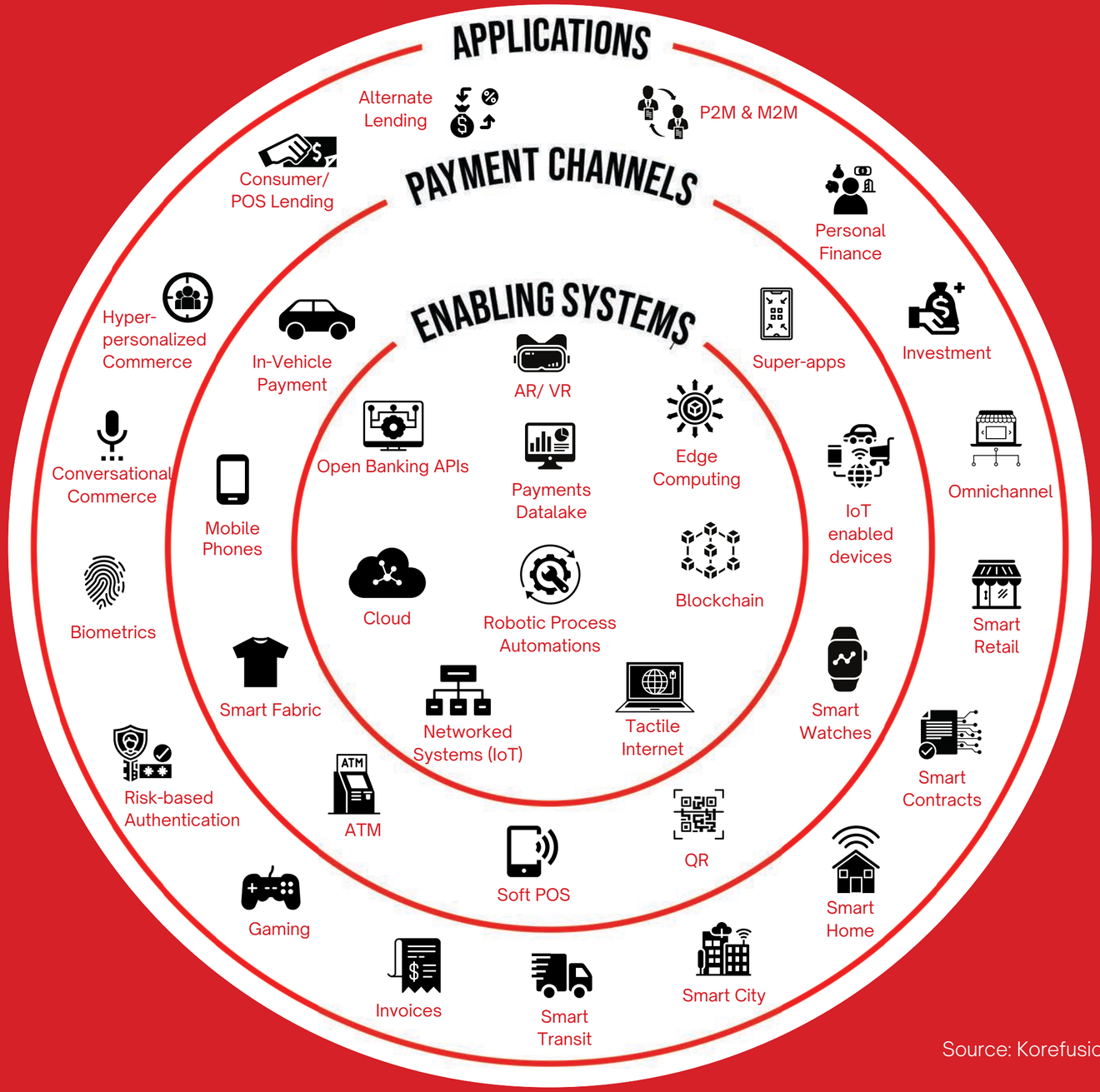
5G Use Cases

5G will allow for a number of new services and applications that will impact commerce and payments, most of which seem futuristic today.

The diagram on the right shows key enablers, emerging payment formats and applications which will leverage 5G.



Source: Korefusion

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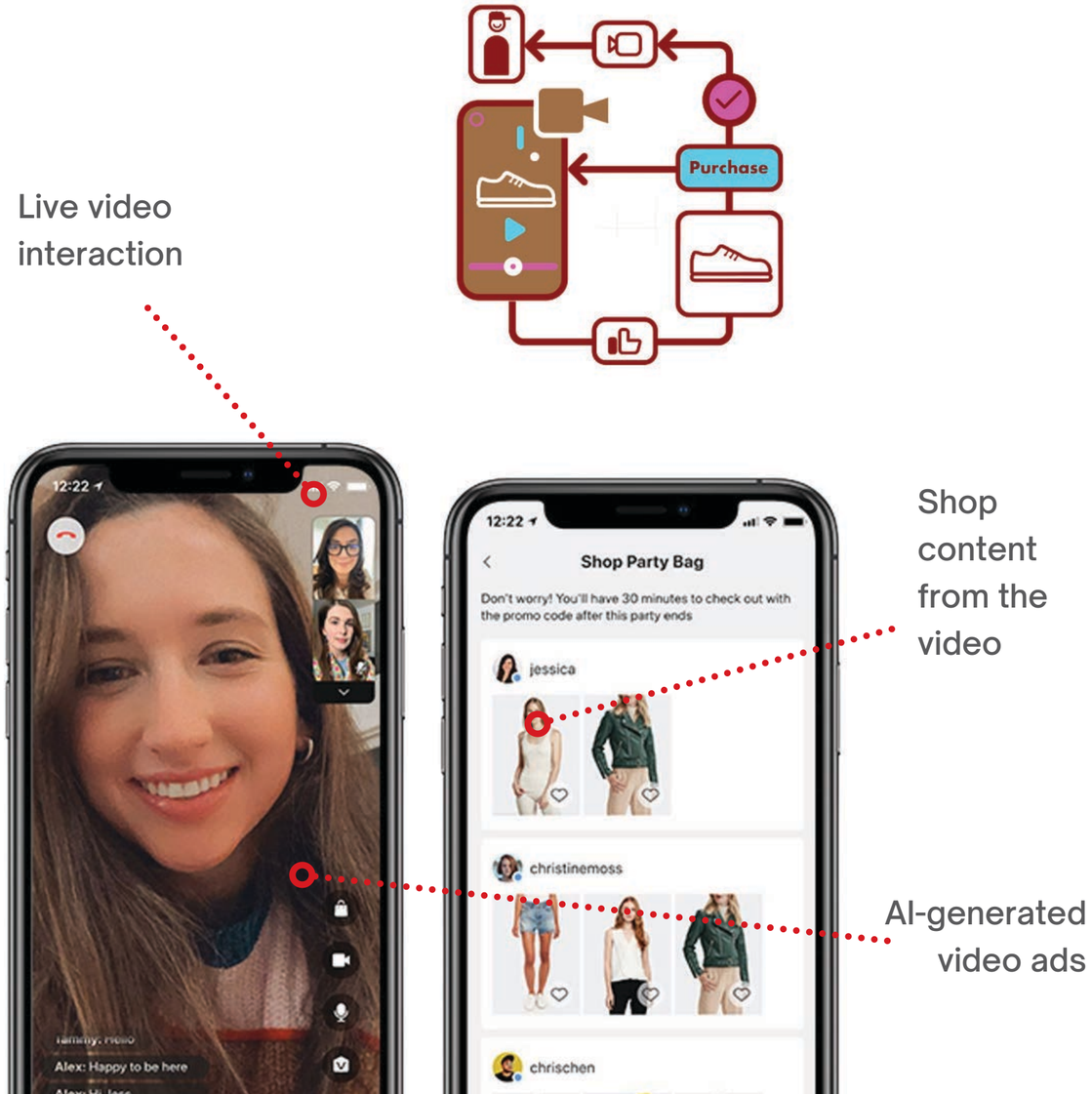
USE CASE I

Live Commerce

Shoppable videos enable both ecommerce and social media platforms to deliver a live commerce experience, where viewers can interact with tagged in-video content and shop directly. Looking at the popularity of live commerce in certain markets, they have the potential to become mainstream with a better network support.

Service providers will be able to tap into customer data and deliver personalized AI-based interactions, product advertisements and user experiences. For instance, a woman while scrolling through her favourite fashion influencer's feed finds a pair of shoes and clicks on it. The affiliate brand fetches her details instantly and creates a virtual image of her styling the shoes which she posts on her social handles to validate the purchase.



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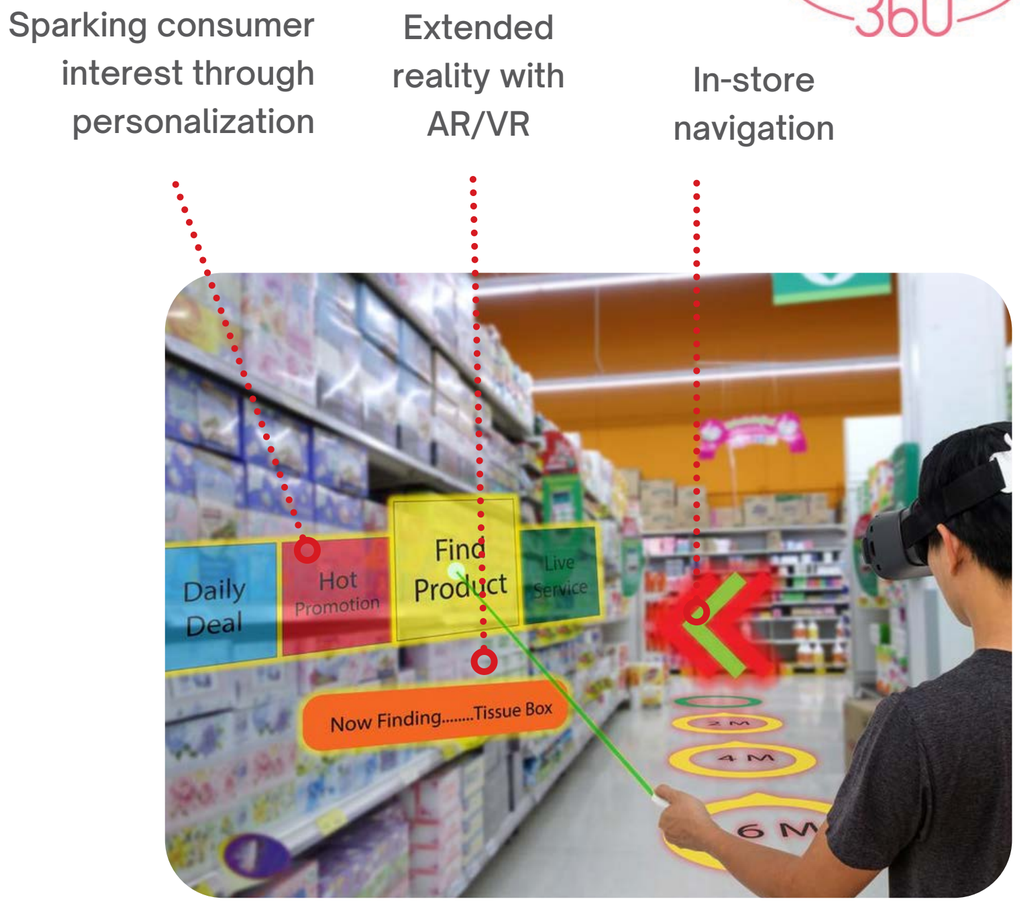
USE CASE II

Augmented Retail

Most customers prefer self-service in a retail store and find it more gratifying than an assisted shopping experience. An augmented retail experience enables a digital self-service experience by superimposing a digital layer onto real world shopping.

Imagine wandering the aisles of a grocery store, with your digital shopping list overlayed in front of your eyes. The screen provides directions to find listed items. On the store signboard, customers receive a personalized offer. Likewise, a customer can visit a store virtually from the comfort of their home with a VR headset and get the same visual shopping experience as a physical retail store. 5G will bring online retail experience one step closer to the physical one.



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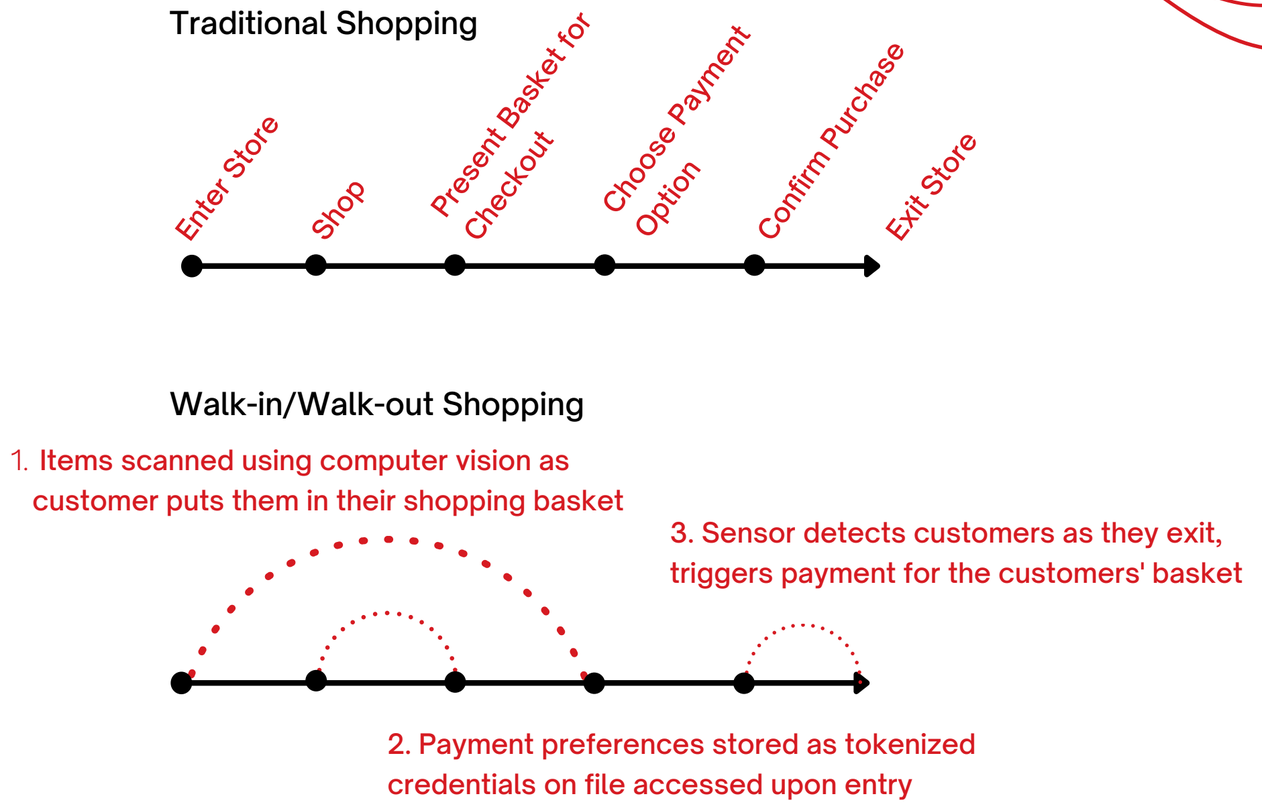
USE CASE III

Walk-in/Walk-out Stores

Walk-in/Walk-out stores lets a customer walk into a store, grab whatever they want and get going. The entire physical act of payments is pushed to the background.

These stores operate using AI, computer vision, invisible payments and ubiquitous internet connectivity. The store can go unmanned and remotely monitored, where all the steps of validating goods, collecting customer details, authenticating the customer and processing the transaction is automated behind the scenes.



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USE CASE IV

Enhanced m-Commerce

With the enhanced shopping experience of ultra low latency with 5G, mobile commerce through apps and mobile browsers will initially see the highest adoption.

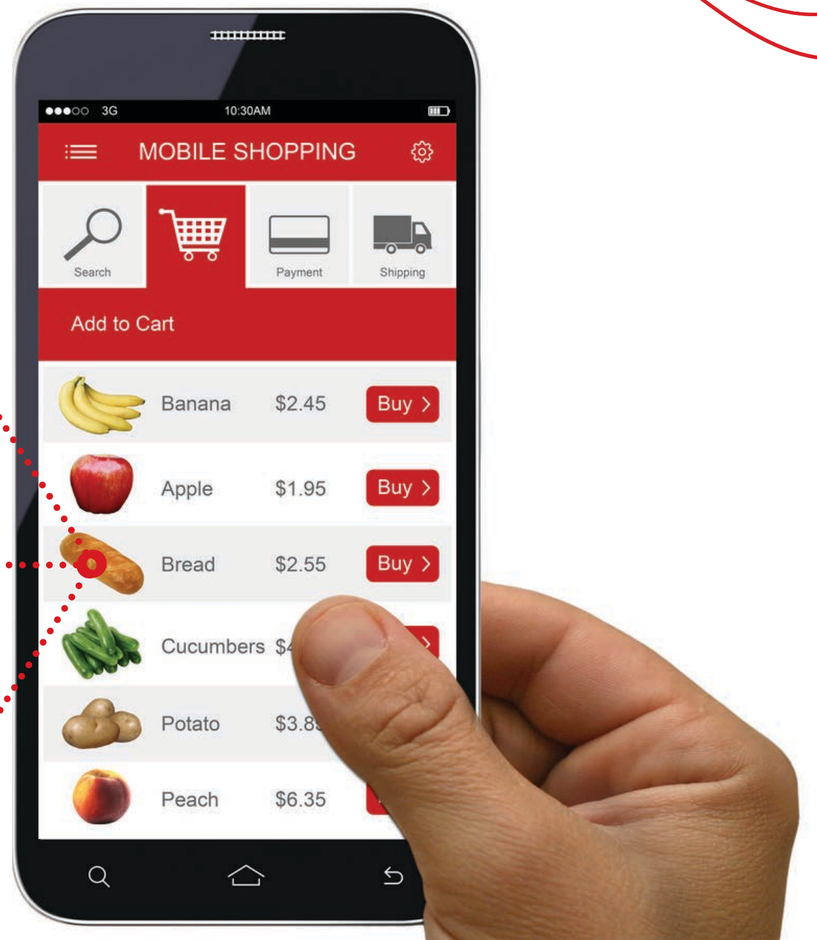
5G will enable m-Commerce apps to engage with rich media (videos, AR/VR) which they avoid right now to manage loading speeds.

Faster, more secure network will help transmit more biometric data points in real-time and prevent fraud better, leading to seamless or a PINless authentication and instant checkouts.

Richer media for an immersive experience

Instant checkouts with PINless authentication

Better fraud protection with more biometric data points



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USE CASE V

Unmanned Smart Vehicles

Unmanned Smart Vehicles are catering to the surge in ecommerce delivery demands in the developed markets.

Smart self-driven vans that run on Computer Vision and AI based technology and can easily replace food and grocery delivery, daily milk and bread runs, courier services and more. A Van and Drone delivery model is able to provide instant doorstep delivery, where drones use vans as rolling distribution hubs for an aerial package delivery.

These autonomous vehicles require uninterrupted connectivity to biometrically authenticate customers and collect payments, made possible with 5G.

1. A mechanic urgently needs spares for a repair and orders from a store on the far end of the city
2. Drone leaves the store and lands on van nearest to delivery location

Van & Drone Delivery

3. Last mile delivery fulfilled by the van

Self-driving Grocery Store

1. Authenticates with facial recognition
2. Collects grocery from compartment

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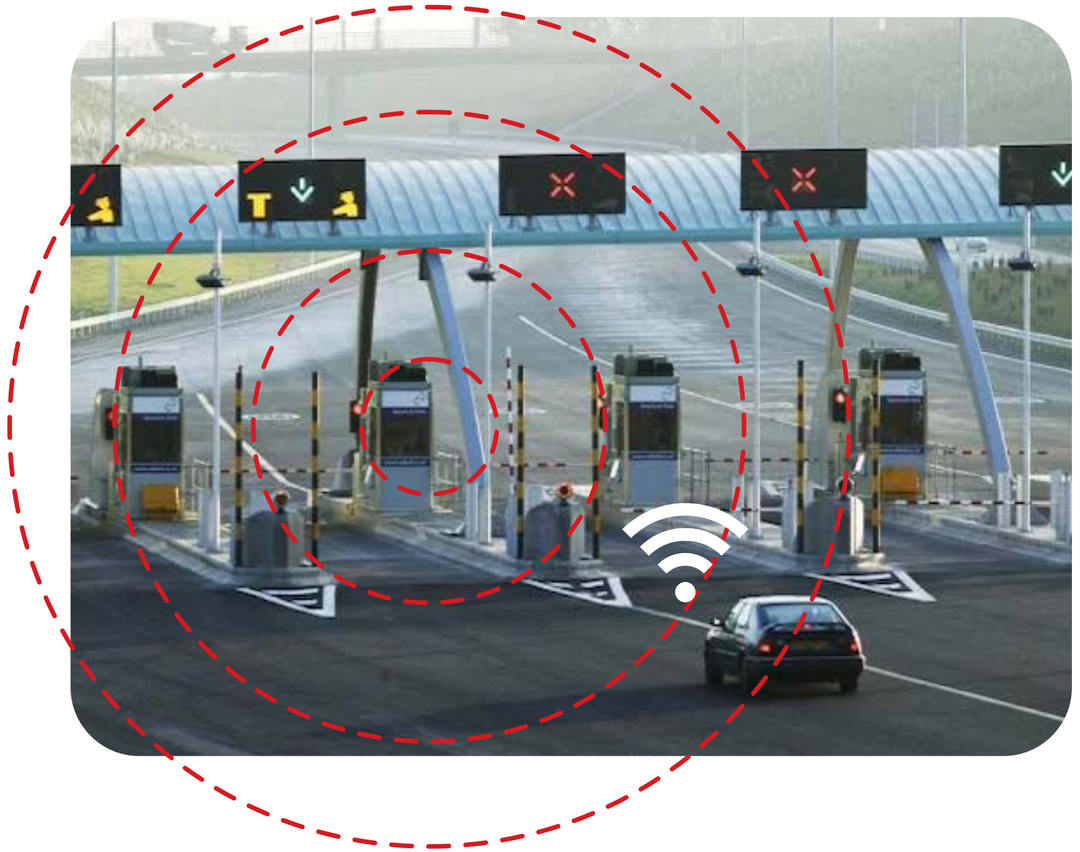
USE CASE VI

M2M Payments

Machine-to-machine (M2M) interactions will give rise to **Machine Customers,** where machines will be able to locate other machines, make autonomous decisions, pay and even earn for themselves without any human intervention. M2M payments will support smaller, more frequent transaction processing models. For instance,

- Car paying a Toll booth
- Car paying at a Fuel station
- Smart home paying Energy provider
- Industry machine paying 3D printer for replacement parts



Machines will have unique profiles and act as a user with a wallet. For e.g., a self-driven Uber which collects ride fare, auto-pays on tolls and at fuel stations through its own wallet.

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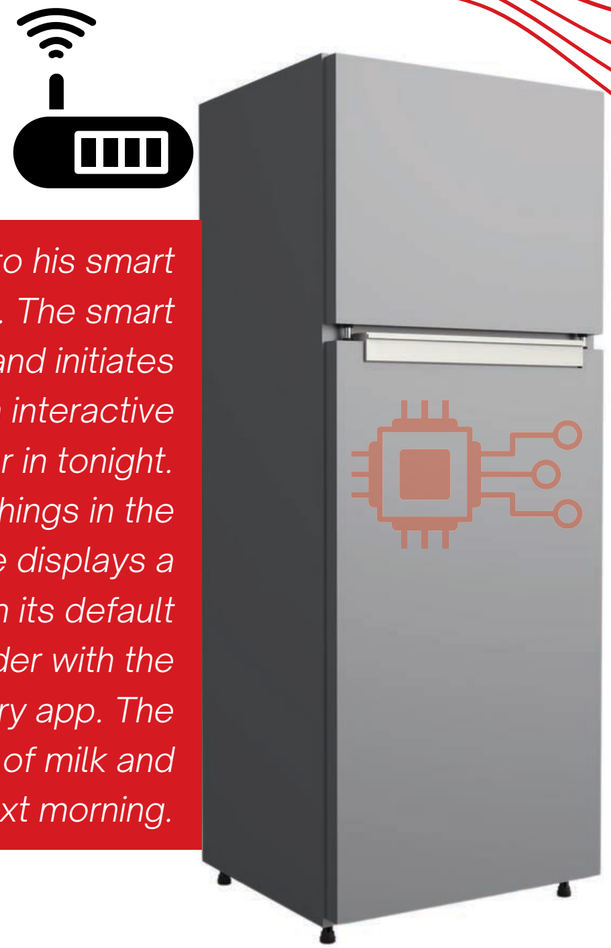
USE CASE VII

Smart Home

Smart home systems are built using sensors, microcontrollers and AI. With 5G and an increase in data processing, smart appliances will be able to process micropayments on their own. These fully autonomous payments will be secured with the help of tokenization.

The example shows how an IoT device combined with Artificial Intelligence and some rules can fully replace the existing modus operandi in which a human completes the order and makes the payment from their smartphone.

A tired businessman returns to his smart home after a long working week. The smart security senses they are alone and initiates the 'Friday Night-in' sequence. An interactive voice asks what should they order in tonight. The businessman unloads his things in the kitchen where the smart fridge displays a selection of take-outs, rather than its default recipe guide. It places the order with the connected food delivery app. The refrigerator also detects it is out of milk and places an order for the next morning.



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USE CASE VIII

Internet of Experiences

Imagine you are playing a multiplayer game, where your in-game character is drinking a can of Red Bull. Since you are the character, you feel like ordering one for yourself, and do that directly from the game with the click of a button.

Such new age points of sale will emerge with 5G, and penetrate into all modes of entertainment and live interactions, creating an Internet of Experiences.

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USE CASE IX

Conversational AI Banking

As smart assistants get smarter and become almost as reliable as a real person, they will become the preferred mode of banking with their high accessibility and round the clock availability. Customers will also be able to access personalized services and financial advise in their native language.

Leveraging open-banking APIs at the backend, service providers will be able to aggregate customer data from multiple sources to create rich customer profiles.

Conversational banking will find its applications in -

Customer Support

Account Servicing

Financial Advise

Meet Kevin White

Age: 30
Annual Income: US$300,000
Wife's income: US$ 100,000
Location: Atlanta, United States
Profession: Engineer
Spends: Restaurants, Gym
Savings: US $350,260
Social Profile: Married with one child
Existing Loans: None
Credit Score: Good

Kevin decides to buy a home and reviews mortgage rates on a real-estate website

Five days later, he withdraws cash from the ATM and receives a notification for personalised advise on home purchase

Kevin decides to have a conversation with an AI-based financial advisor Inputs budget – US $500,000

Six-eight weeks later, the bank picks signals from his social network and sends a notification *"Congratulations on your new home! Now avail 30% discount at these Home furnishing stores. Click to activate."*

He logs into his mobile app and fills out a pre-populated loan form which is approved within 24 hours

Global Bank offers to cover 80% of the amount at 8.45% interest rate for 15 years

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USE CASE X

Seamless Biometrics

Biometric authentication methods like gait analysis can be actualized with 5G because of the abillity to share data over high bandwidth, lower latency network. It will also make authentication modes like face recognition safer and infallible for payment authentication and enable newer modes of biometric payments like 'Smile to Pay'.

Emerging Biometric Authentication Modes

Palm/ Fingerprint Recognition

Retina Scanners

Face Recognition

Gait Analysis

Voice Recognition

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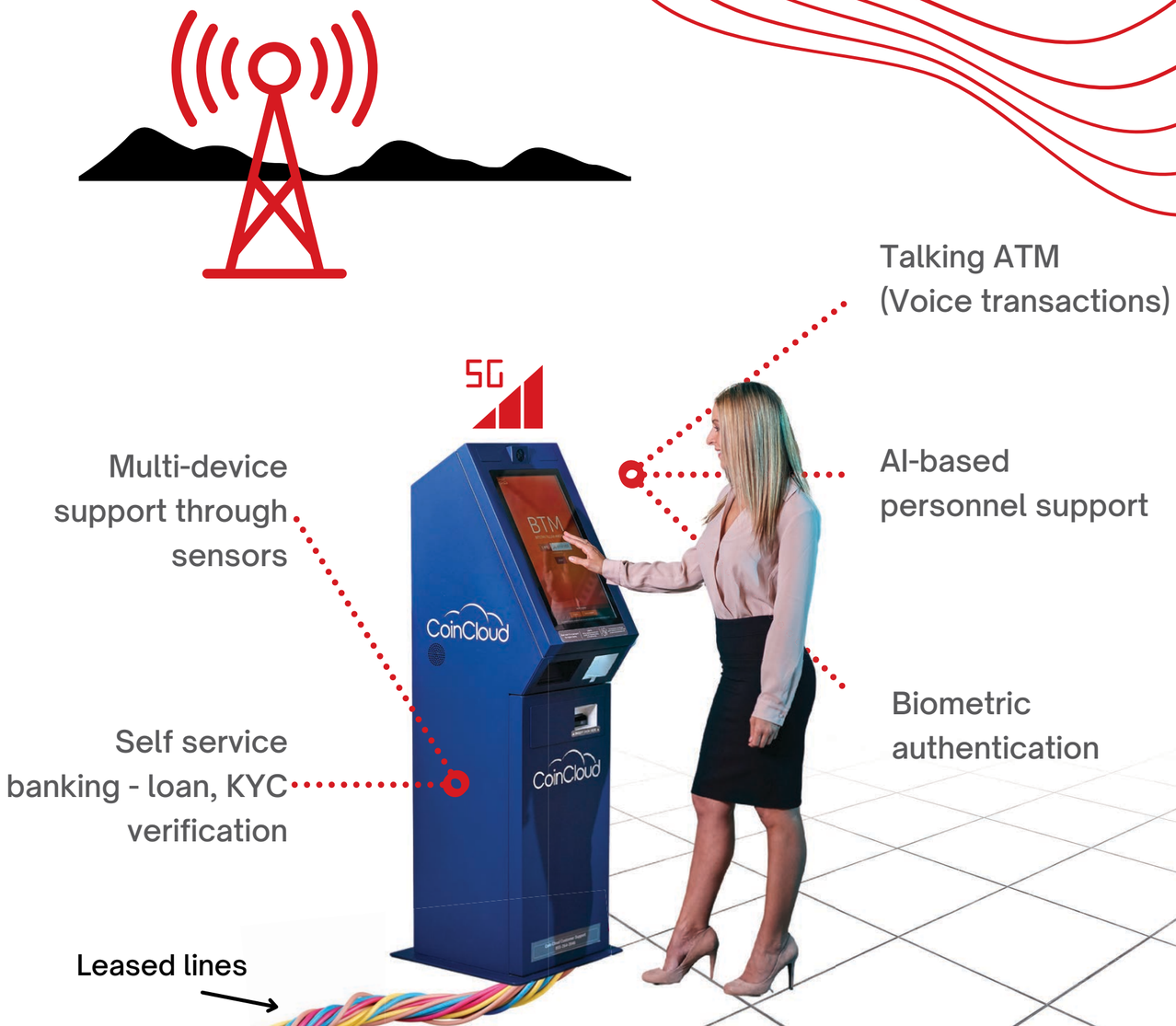
USE CASE XI

Smart ATMs

The future of ATM is smart. ATMs will be able to instantly recognize the user through biometric authentication and offer them a personalized services menu. 5G will also bring real-time support facility for a conversational banking experience to the ATMs, making them an extension of the bank branch.

Smart ATMs will be able to collect elaborate data on its usage and condition, and dynamically forecast cash demands or self order a repair component.

As 5G becomes more pervasive, it will help in bringing ATMs to remote regions where traditional lease lines cannot reach.



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USE CASE XII

Vision of a Smart City

Payments are an integral, basic component of a Smart City. 5G will unlock many innovative use cases to improve living standards for citizens.

Some instances of how a smart city will function are:

- Broken street lamp will be able to place an auto-repair order to the city.
- Drivers will be quickly able to locate parking spaces and avoid congestion. Parking meter will be unmanned and automated.

- Vehicle-to-vehicle, vehicle-to-infrastructure and vehicle-to-pedestrian communication will avoid accidents. Any accident will trigger an automatic SOS from the vehicle itself to the nearest hospital.
- Citizen apps will provide real-time critical information like a route blocked due to fire emergency.
- Smart energy grids that will help with energy conservation.
- Smart waste collection where unmanned e-vehicles will do a daily run through houses and public spaces, guide people how to properly dispose off waste and incentivize them to do so.

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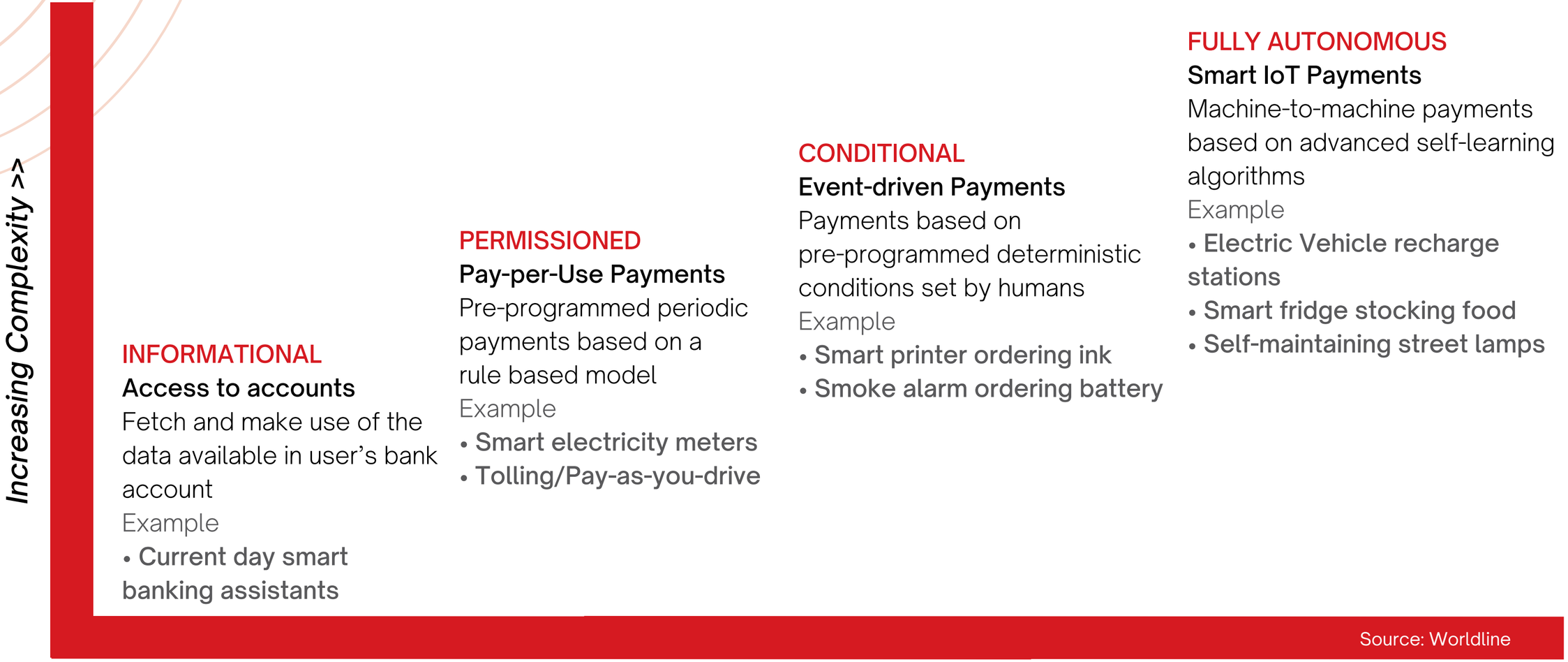
In a 5G world, payments will evolve in its complexity and autonomy, going from Informational -- where it will fetch user data and make use of it to provide services -- to fully autonomous where things will pay for themselves and will give rise to machine customers.



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Get Future Ready with

FSS
POWERING PAYMENTS

With the rise of machine customers, smart devices and need for instant connectivity, the number of transactions will explode. FSS mission is to create the underlying digital infrastructure that will unlock the floodgates of digital payments and commerce. FSS will work with industry stakeholders to provide industrialized and robust payments processing infrastructure that can scale to handle billions of small value high volume transactions.

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About FSS

FSS (Financial Software and Systems) is a leader in payments technology and transaction processing. FSS offers an integrated portfolio of software products, hosted payment services and software solutions built over 30+ years of experience. FSS, end-to-end payments products suite, powers retail delivery channels including ATM, POS, Internet and Mobile as well as critical back-end functions including cards management, reconciliation, settlement, merchant management and device monitoring.

Headquartered in India, FSS services leading global banks, financial institutions, processors, central regulators and governments across North America, UK/Europe, Middle East, Africa and APAC.

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