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A Holistic Approach to IoT Monetization

A Heavy Reading white paper produced for Tata Consultancy Services



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EXECUTIVE SUMMARY

The monetization capabilities of Internet of Things (IoT) platforms needs a fresh approach beyond standard rating and charging designed for connectivity usage. As communications service providers (CSPs) embrace more innovative IoT business models, they are struggling to address these opportunities with their connectivity-oriented IoT platforms.

IoT services (as distinct from pure connectivity) are quite different from a CSP's existing lines of business. For example, IoT services are not just charged on a flat-rate subscription or on a per-MB-of-data basis, but are instead charged based on myriad factors that tie into the many use cases for connecting things to the Internet.

Moreover, unlike traditional telecom services, the revenue generated from IoT does not mainly accrue to the CSP, but must instead be shared with an ecosystem of partners. These idiosyncrasies give rise to several challenges in the design of software systems that support the monetization of IoT.

Also, the low average revenue per user (ARPU) generated from IoT services mean that they cannot be run profitably in the same way as traditional telephony. IoT requires more cost-effective ways to onboard customers and devices, and to manage the large number of connections. IoT platforms must provide global SIM management, cellular connectivity, device management, service monitoring, diagnostics, analytics, security, customer care, policy management, charging, cost and rate management to manage the scale of IoT services.

By modernizing their IT to support IoT, CSPs can benefit in several ways:

- New revenue opportunities from offering new products and services
- Faster time to market with catalog-driven architecture
- Greater operational efficiency via closer integration of IoT and enterprise IT systems

FIRST-GENERATION IoT PLATFORMS ARE FALLING SHORT

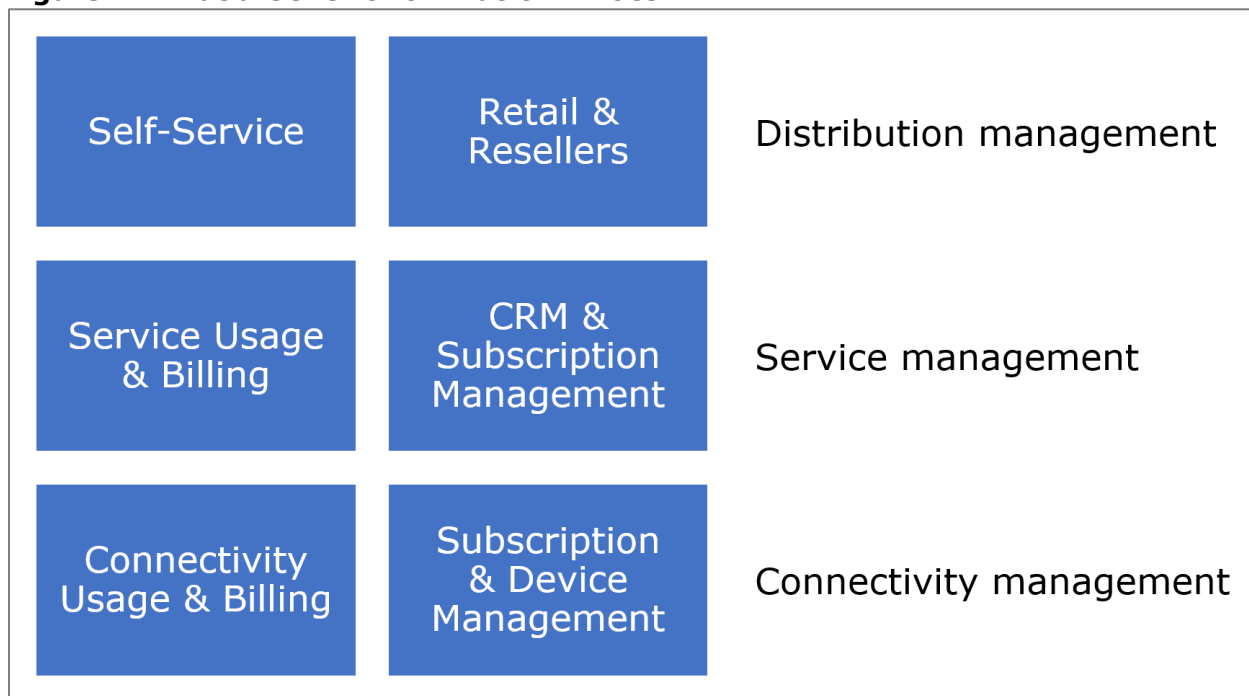
IoT services generally have a much lower ARPU than traditional telecom services, although the number of "users" can be much higher – IHS forecasts the number of IoT connected devices to increase from 20.4 billion in 2017 to 75.4 billion by 2025. To be cost-effective at these low per-device revenue levels, CSPs must be able to onboard customers and devices cost-effectively. At the same time, the enterprise accounts buying IoT services are usually large and expect a higher level of customer support than a retail consumer. The unique demands of IoT services has led to the rise of specialist management platforms.

As **Figure 1** indicates, these IoT platforms provide global SIM management, cellular connectivity, device management, service monitoring, diagnostics, analytics, security, customer care, policy management, service monitoring, charging, cost and rate management. For their initial forays into IoT, many operators have simply integrated these IoT platforms with their existing invoicing systems.

The end-customer billing aspects of IoT, at least in its early machine-to-machine (M2M) phase, are similar to existing CSP billing – a mix of subscription- and usage-based. However,

some CSPs chose to use their IoT platforms for basic usage rating and charging in order to avoid the cost of repurposing their existing business support system (BSS) assets (the suppliers of which often charge exorbitantly for change requests). The IoT platforms handle the IoT rating and pass summary reports to the incumbent BSS to produce an invoice.

Figure 1: What a Generic IoT Platform Does



Source: Heavy Reading

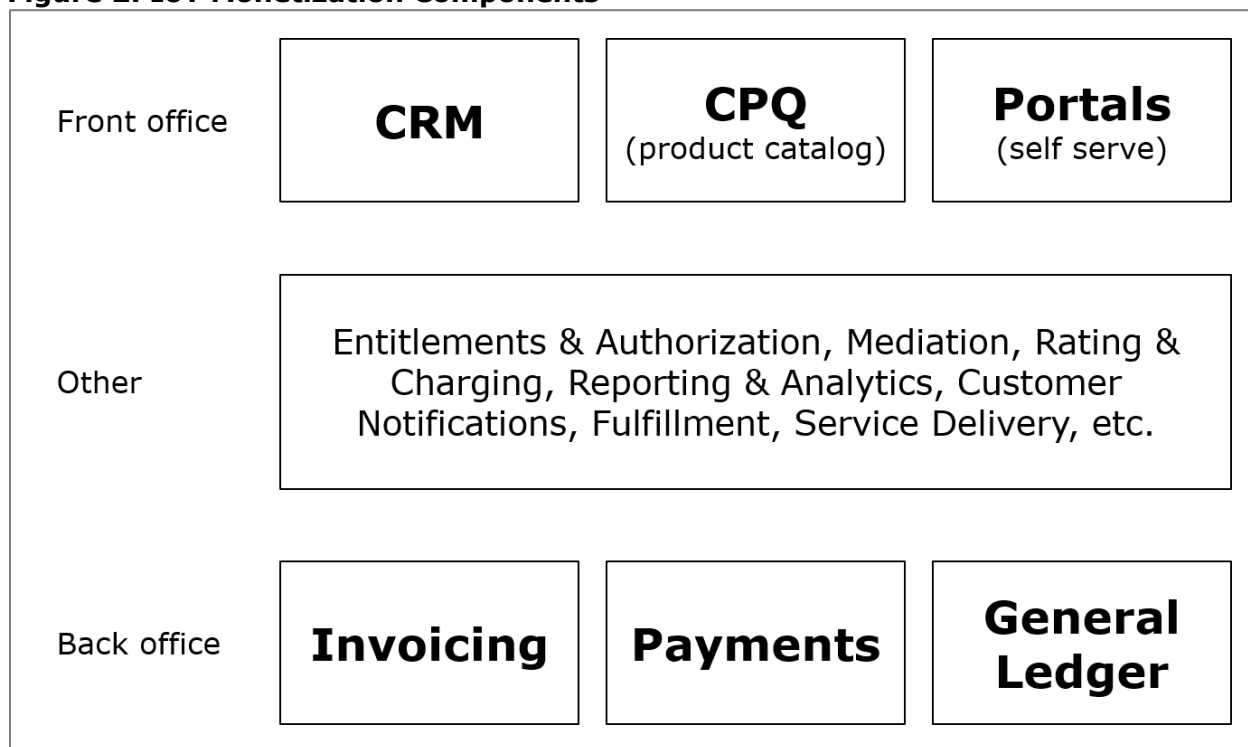
What Is IoT Monetization?

By IoT monetization, we refer to the software systems that enable CSPs to commercialize the myriad services described by the umbrella term, Internet of Things. Heavy Reading's taxonomy for IoT monetization is shown in **Figure 2**. It includes:

- Invoicing
- Payments
- General ledger integration
- Mediation, rating and charging
- Reporting and analytics
- Customer relationship management (CRM)
- Configure-price-quote (CPQ)
- Customer-facing portals

All of the elements in our IoT monetization taxonomy are interlinked and must share information.

Figure 2: IoT Monetization Components



Source: Heavy Reading

IoT Monetization Challenges

Digital technologies have deconstructed traditional value chains, enabling new opportunities of delivering value to customers. The path to these new value creation and monetization strategies presents several challenges to the supporting software systems.

Key challenges include:

- **Complexity of pricing models:** An individual SIM might have unique tariffs, together with bundles and special rates. It might have a connection charge and a recurring charge, potentially invoiced at different times and to different parties.
- **Complexities of IoT business models:** Manufacturing, retail, connected car, home security, transport and logistics, drones, etc., all have distinct business models that go beyond a basic subscription service.
- **Partner settlement:** Where CSPs provide more than basic connectivity, their monetization system must enable settlement with multiple parties (device manufacturers, independent software vendors, systems integrators) in a transparent and auditable manner. They must enable personalized contracts with each partner in the ecosystem, with a highly automated partner on-boarding process and advanced self-care capabilities so that partners can manage their preferences autonomously.

Complexity of Pricing Models for IoT

As **Figure 3** shows, there are many different pricing models for IoT services.

Figure 3: Pricing Models for IoT Services

Model	Comment
Event-based	Pay per download, upload, electric car recharge, vending machine dispense, etc.
Pay as you go	Customers pay according to the actual usage of the service.
Pay for results	For example, the IoT startup Enlighted Inc. builds devices that can detect heat, light and motion, and uses them to control lighting, heating and cooling. Customers pay Enlighted a percentage of the money saved on energy bills, without paying anything upfront.
Flat rate	For example, for a home alarm system with minimal data usage.
Freemium	Attracts customers that are unsure of the value of the offering and allows them to trade up to paid services.
One-time charge	Largely used with products, though it can be used with services.
Quality of service (QoS)-based	Tiered pricing based on differing QoS requirements of different applications. For example, a heart monitoring application would require higher QoS than a vending machine replenishment application.
Subscription	For different durations with different billing frequencies (monthly, quarterly, etc.).
Variable	Based on size, volume, location and time of traffic, as well as directionality (up or downstream to the end device).

Source: Heavy Reading

According to the TM Forum's [Billing and Charging Machine to Machine Challenges](#), most IoT service providers are adopting one of three pricing models: fixed fee (flat rate), transaction-based (pay per use) and revenue sharing. However, this may reflect limitations in existing revenue management systems, rather than an aversion to more innovative pricing models.

Charging for data usage on a mobile network is simple. The challenge for IoT service providers is when they want to apply some of these more sophisticated pricing models for industry-specific, vertical applications. For example, an insurance service might be charged based on miles traveled. A smart-metering application might charge based on the time of day of consumption, less kW-hours returned to the grid from the consumer's own solar panels.

The pricing model doesn't just affect the rating, charging and billing process; it needs to be taken into account in the product catalog that salespeople use to make offers to potential customers. These products might be similar to traditional consumer devices with set data packages (5 MB, 1 GB, 5 GB, etc.), but more likely they will need to be flexible enough to enable tailored pricing, directly negotiating specific terms with each customer.

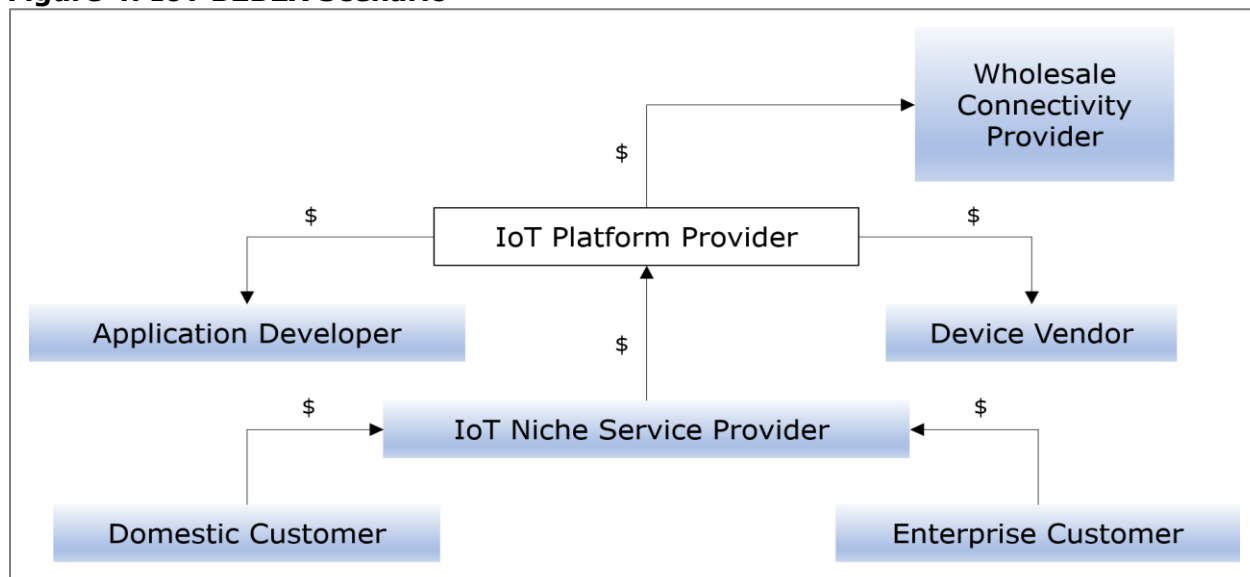
Complexities of IoT Business Models & Partner Settlement

In addition to complex pricing, IoT business models often entail complex business-to-business-to-X (B2B2X) relationships, where "X" could be an end customer, a value-added reseller or some other intermediary.

Figure 4 shows an example of an IoT platform provider and the various business relationships it needs to manage as part of a B2B2X service. It pays a third-party wholesale connectivity provider for regions where it has no access network; an application developer for software used to manage devices with SIM cards, access reports, management dashboards

and application programming interfaces (APIs); and a device vendor for monitoring devices for fire or burglar detection. A niche IoT service provider that offers home and office security monitoring services pays the platform provider for its service and resells it (alongside other services, such as consultancy and insurance) to domestic and enterprise customers.

Figure 4: IoT B2B2X Scenario



Source: Heavy Reading

The billing system must support all these relationships, levels of charging and processes for the end-to-end billing chain. Billing support for SIMs, devices and applications will involve different payment rules (one time, usage based, recurring, etc.), with different sources of data and QoS policies. Billing is no longer simply associated only with a SIM card and a device; today it involves multiple organizations, agreements and settlement methods.

Another example of a complex IoT business model is the original equipment manufacturer (OEM) connected car. A service provider agreement might cover millions of devices across multiple continents. Initially, the OEM/manufacture might pay for connectivity services until the dealer accepts delivery of the car. The OEM may then only pay for diagnostic data, and the dealer pays for all other services. When the car is sold, the dealer might pay for core services for a fixed period, but the user pays for additional services available via a third-party service provider. Consequently, the CSP might need to bill three separate entities for the one device (the car) and make settlement payments to multiple third-party service providers (for wireless connectivity in regions where they have no network and for value-added services delivered to the end customer).

Existing BSSs Are Unsuitable for IoT

CSPs have extensive systems in place for the monetization of their traditional telecom operations: consumer, enterprise and wholesale. However, IoT is sufficiently different from CSPs' existing lines of business that their legacy BSSs would need significant adaptation to support the myriad pricing models and business models outlined above. Legacy BSSs are too rigid to support dynamic transactions involving a complex mix of shared revenues, subscriptions, metered usage, one-time charges, overages, sponsored data, etc.

Legacy BSS change requests often entail significant coding and high costs. Legacy BSSs are often built on old IT platforms that can make them difficult to scale cost-effectively. They also often have a high degree of manual services involved, which makes them uneconomic for the low ARPU of IoT.

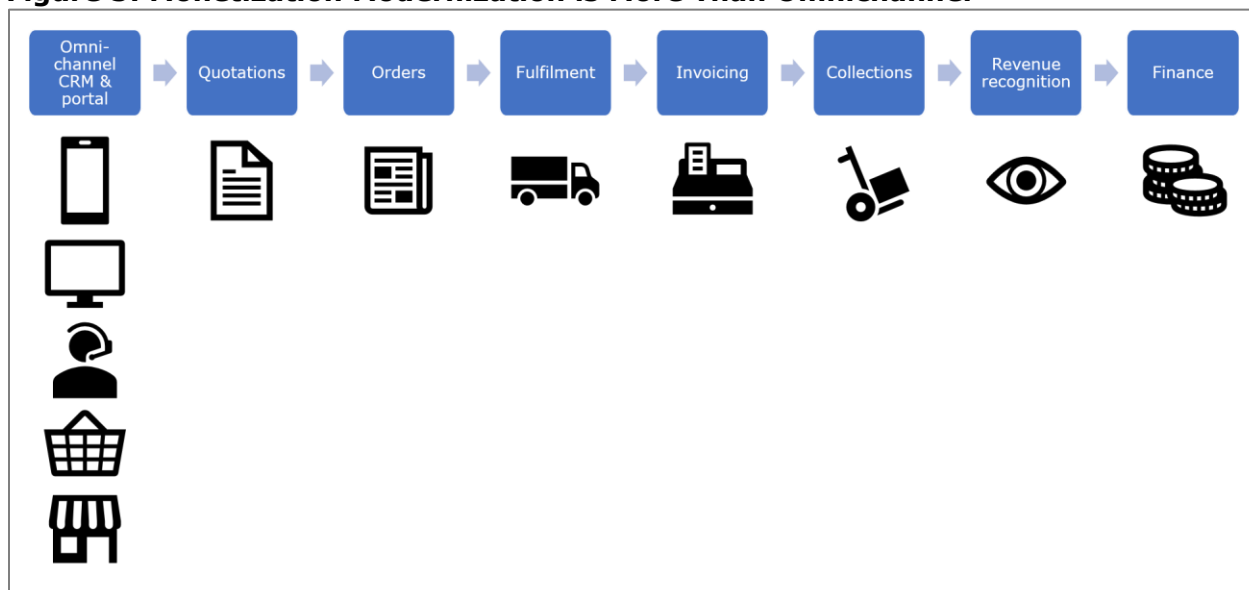
An Omnichannel Front End Is Not a Monetization Panacea

Omnichannel has been a popular buzzword in the retail industry for several years. The omnichannel concept is about sharing information across the various channels through which you engage with customers (call center, store, website, mobile app) to provide a more joined-up experience.

For example, many consumers start their shopping journey in digital channels (website, app) but often transition to assisted channels (call center, store) to complete their purchase. If the assisted channel is aware of the consumer's digital channel history they can be better prepared to make the right offer to the customer.

While CSPs have invested heavily in omnichannel solutions in recent years, they have generally not invested in the back-end BSSs on which the omnichannel solution depends. This is like buying a brand-new Ferrari but keeping your old engine under the hood. Two-speed IT sounds like a great idea in theory, but in practice, a chain is only as strong as its weakest link.

Figure 5: Monetization Modernization is More Than Omnichannel



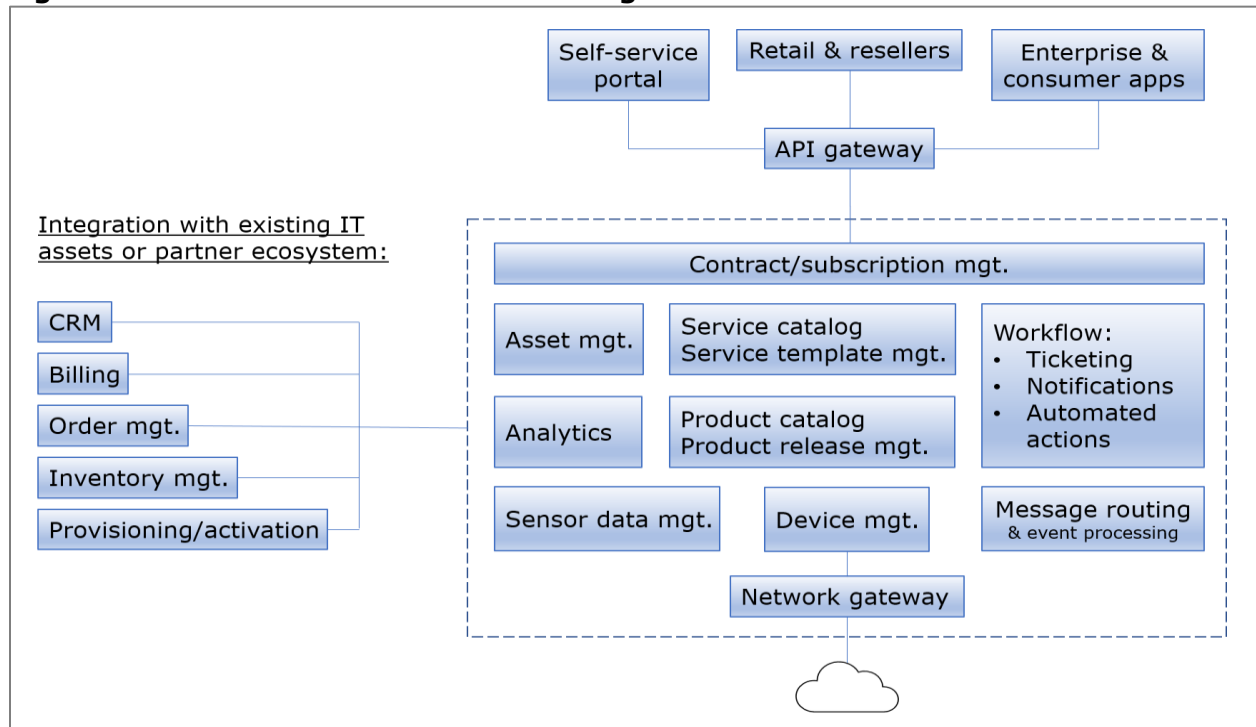
Source: Heavy Reading

NEXT-GEN IoT PLATFORMS TO DRIVE REVENUE GROWTH

It is unlikely that a one-size-fits all approach will work for IoT service providers. Instead, they are likely to build a management platform from a mixture of legacy IT assets (e.g., billing), newly acquired assets (e.g., a device management solution) and software delivered as a service (e.g., CRM).

Figure 6 shows one possible architecture. The IoT service provider has a core platform comprising contract management, service and product catalog, device management and workflow tools. This connects via a network gateway to the Internet-connected "things." Northbound it connects via an API gateway to customer portals, reseller portals and third-party apps, which work in tandem with the core IoT service. The platform also connects westbound with existing IT assets or third-party software that is being used to deliver the overall IoT service.

Figure 6: Potential Architecture of IoT Digital Platform



Source: Heavy Reading

Key Requirements of IoT Digital Platforms

IoT management systems must be flexible to enable CSP agility. As IoT business models evolve, the platform must be able to keep pace, allowing CSPs to adopt a "fast-fail" mentality, experimenting with new products and processes. Important functionality that is often missing from existing IoT platforms includes:

- Advanced usage rating and metering models for more sophisticated rate plans.
- Product/service design catalog that allows salespeople to market these sophisticated rate plans.
- Ecosystem management and partner settlement.
- Subscriber dunning management (chasing overdue payments).
- Enterprise IT integration – e.g., integration with CRM for automated quote to order; integration with enterprise resource planning (ERP) to better align usage and billing with the revenue schedule.
- Automated invoicing and payments (credit card, ACH, etc.).

Figure 7 highlights key requirements to consider in IoT digital platforms.

Figure 7: Key Requirements of IoT Digital Platforms

Feature	Requirements
Product catalog & price plans	<ul style="list-style-type: none"> Enables one-time purchases, recurring subscriptions (monthly, quarterly or annual), usage-based contracts, trials, add-ons, discounts/promotions, freemium, tiered pricing Allows for the charge to be built into the cost of a connected device or subsidized by the network operator Enables account representatives to create personalized offers Can configure, test and implement new service offerings quickly through configurability (not coding) Products configured by customer tier, region, country, etc., with support for multiple languages, currencies and taxation rules
Subscription management	<ul style="list-style-type: none"> Templates to speed customer onboarding with configurable customer types Allows for complex account relationships and hierarchies (enabling direct sales, sales through resellers, billing on behalf of third parties and other B2B2X permutations) Contract management includes upgrade paths and staggered charge start dates Customers can view balances, usage, pay bills, change plans, etc., on online portal
Rating & charging	<ul style="list-style-type: none"> Pay per use, segmented tariff plans, custom usage mediation Real-time rating Usage sharing and pooling options Tiered usage rating and notifications Granular measurement of data usage between application streams to enable split billing
Billing	<ul style="list-style-type: none"> Split billing and service level rating – e.g., telematics data billed to an automotive OEM and infotainment data for the same car billed to the consumer Connectivity and service level billing – dynamic pricing for wholesale data and SMS Bill cycle dashboards, configurable bill frequencies, invoicing, bundled (rolled-up) billing
Financial management	<ul style="list-style-type: none"> Accounts receivable – automated dunning, custom collection profiles, automated suspension of accounts in arrears Revenue leakage controls Credits and refunds Payments – multi-currency, credit/debit card, batch payment files Customizable general ledger interface Easy integration with third-party ERP, payments and tax systems Revenue recognition rules compliance (ASC606/IFRS15) Blockchain billing based on smart contracts for roaming settlement and microtransactions
Other	<ul style="list-style-type: none"> Device management (configuration management, device discovery and load, activation, diagnostics, firmware updates, service assurance and quality, device adaptors, multi-protocol support, multi-domain support) Reporting and analytics (for customer service reps, operations personnel, product managers, finance staff and the end customer themselves) Open integration (APIs to payment gateways, third-party tax packages, etc.) Deployment – hosted and managed services, on-premises and software as a service (SaaS) Security and scalability Compliance with personally identifiable information and data localization laws

Source: Heavy Reading

Business Benefits

By modernizing their IoT platforms and harnessing these opportunities, CSPs can benefit from:

- **New revenue opportunities:** Offering new products and services or new pricing models create new opportunities. For example, an insurer can charge premiums for car insurance based on the consumer's driving history and behavior.
- **Faster time to market:** A key barrier to product and service innovation today is rigid product and service catalogs that are expensive to customize. Modernizing these catalogs can reduce development time and costs.
- **Improved customer experience:** A modern IoT platform should enable self-service portals (including mobile apps), allowing the customer to have greater control of the IoT service they are consuming. This not only leads to better customer experience, but it also reduces the amount of customer support that is required.
- **Greater operational efficiency:** This can be achieved by closer integration of IoT and enterprise IT systems. The IoT platform must be scalable so that it can meet future performance needs without a corresponding increase in operational expense.

CONCLUSIONS

Today's highly fragmented and non-standardized IoT technology landscape can make it difficult to manage IoT services effectively. Significant costs and skills are required to integrate data from multiple devices and develop useful applications. CSPs are stuck in a vicious cycle of patching systems instead of truly transforming their IT. Modern IoT platforms can lower costs and boost revenue potential by being better able to exploit new business opportunities.

CSPs must realize that IoT is more than just device management. There is a need to integrate with existing IT systems. Solutions with open APIs can integrate into a broader ecosystem including ERP, supply chain management and partner/contract management systems. SaaS can enable IoT service providers to rapidly scale their business and cope with fluctuating demand. Not all modules within an IoT platform need to be "as a service": For example, a company might choose to run the real-time charging module this way, as the cost of adapting an existing charging system may be prohibitive, with billing run as a self-managed application.

IoT digital platforms must be flexible to enable CSPs to accommodate a wide variety of B2B (enterprise), B2C (consumer) and B2B2X (wholesale) business models. As IoT business models evolve, the monetization platform must be able to keep pace allowing CSPs to adopt a "fast-fail" mentality, experimenting with new products and processes. IoT service providers need not only a more holistic solution from a technology perspective, but also a solution that can cater to different business models and different needs within their organization, as typified by the three cases below:

1. A line of business with a focused IoT service offering (e.g., fleet management) that wants to ensure a great customer experience and agility to keep its offering fresh.
2. An IoT platform offering that aims to enable third parties to sell their industry-specific, niche IoT solutions.
3. An operational team that is charged with managing the IoT platform, guaranteeing availability and striving for flexibility while keeping operating costs under control.

ABOUT TATA CONSULTANCY SERVICES LTD. (TCS)

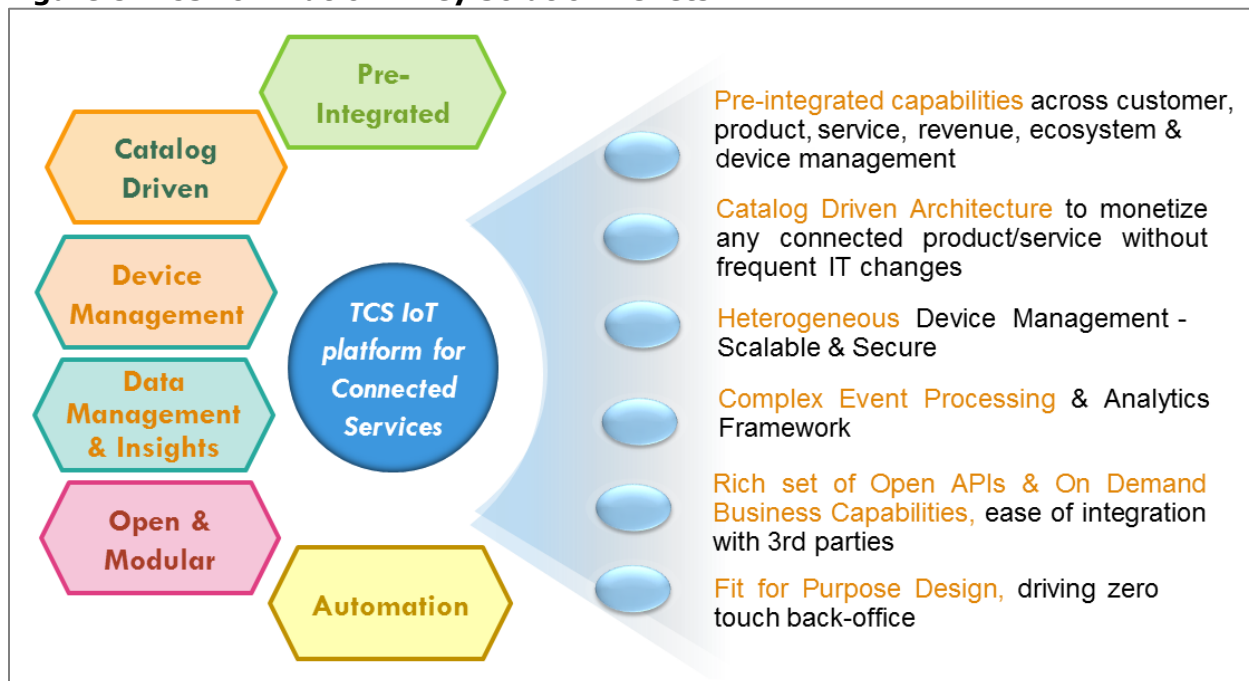
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About TCS HOBS

TCS' Hosted OSS/BSS Solution (HOBS) offers a zero-touch platform to help enterprises manage IoT services. The rapid adoption of IoT technology by businesses worldwide has on one hand improved operational control for enterprises, while on the other, resulted in the development of new, innovative offerings such as smart home, connected car, remote fleet management, and so on. This translates into a whole new set of monetization opportunities, which calls for a fully integrated IoT enablement platform to manage operations and tap into the revenue potential.

Based on a catalog-driven architecture, the platform enables businesses to rapidly launch, manage and monetize any IoT service. The cloud based pre-integrated platform includes comprehensive capabilities to configure product offers, govern sales activities, activate subscriptions, deliver customer support, manage heterogeneous devices, monitor process usage and generate bills.

Figure 8: TCS IoT Platform Key Solution Tenets



Source: TCS

TCS HOBS also lets you manage a complex partner ecosystem by streamlining key activities, such as partner onboarding, services bundling and settlements. Backed by open APIs and a strong analytics engine, the framework helps build customized IoT apps rapidly and allows seamless integration with existing systems.

With TCS HOBS, enterprises can focus on core business activities while TCS tackles the technology needs in an "as-a-service" model. Key benefits include:

- Reduced time to market: Launch any IoT service in a quick and cost-effective manner, and grow market share exponentially
- Partner ecosystem management: Efficiently manage large partner relationships enabled through ease of partner onboarding, product bundling and settlements
- Lower TCO: Enjoy the flexible commercial model to pay as you grow

To find out more about TCS HOBS, watch this Light Reading webinar from September 2018: http://www.lightreading.com/webinar.asp?webinar_id=1239

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