The Digital Business Marketplace Catalyst

Tackling the worldwide digital ecosystem with frictionless partnering and secure, zero-touch establishment and in-life management of IoT devices at scale

Champions: BT, DT, NTT, T-Mobile
Participants: Agile Fractal Grid, BearingPoint, Digiglu, Intel
The Digital Business Marketplace Catalyst

- The **Vision** is to create a worldwide ecosystem, where businesses can bundle, assemble and trade each other’s products & services and sell & support these new offerings to customers in a frictionless **self-service** digital way.

- The **Mission** is to leverage the TM Forum catalyst programme, to shape and test key “partnering and customer” use cases in a prototype that will illustrate the business case for traditional companies to participate in the digital worldwide ecosystem – enabling the 4th industrial revolution.

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Example anatomy of a Digital Business Marketplace ecosystem

Frictionless Trading Relationships
Problem Statement:
Digitally Transform or face extinction!

• Consumers expect to be able to buy & configure any/everything on their Smartphone, “self-service”
  – Increasingly a similar configure & buy experience is expected in B2B scenarios, e.g. SmartOffice, SmartGrid, SmartEnergy, SmartFactory, SmartCity, etc… as well as SmartHome and SmartVehicle

• As traditional industries move their products and/or services to be Smart “end-to-end solutions”, by applying eSIM’s or IoT devices to physical goods, this implies a need for organisations to combine different components to deliver end-to-end solutions, anticipating a “Digital Business Marketplace”

But there are complex barriers and hurdles hindering the Digital Business Marketplace getting established and being able to scale. The need is…

• … for “Frictionless Trading” between different traditional organisations
• … to define and adopt industry agnostic repeatable patterns
• … to remove manual processes and achieve Zero Touch Onboarding (ZTO) & in-life Management
• … to ensure secure / non-hackable devices and systems
• … to provide milli-second decision making capabilities at the edge

The Digital Business Marketplace Catalyst *delivers*...
The need to remove manual processes...

... and achieve Zero Touch Onboarding (ZTO) and Management of end-to-end solution components, i.e. IoT devices, products, applications, services – and simultaneously secure devices’ supply chain...

Device Arrives
Installation & Connection
Manual Configuration
Provisioning with IT Backend
Onboarded
Local Management

Zero-Touch Onboarding

Saving 20 mins per device.... for 3m devices = a saving of **500 man years** of onboarding work !

The aim is to offer **cost-effective, secure & scalable** solutions for the IoT market, dealing with onboarding of **millions** of devices **automatically** as **assured** and **fully trusted** endpoints.

Delivering secure / non-hackable IoT devices and systems leveraging encrypted keys with unique passwords (VPN tunnelling etc), with a fully trace-able and secure automated supply chain and granular monetization for all the partners.
Device Onboarding with SDO

1. Build and Ship SDO Enabled Devices
2. Register Ownership to Target Platform
3. Register Devices with SDO Server
4. SDO redirects Device to its target Platform
5. Device Authenticated and Provisioned
6. Device sends data to IoT Platform
Zero-Touch Onboarding

- Zero-Touch Bootstrapping (ZTB)
- Zero-Touch Attestation (ZTA)
- Zero-Touch Device Management (ZTD)
- Zero-Touch Connection (ZTC)

Device Arrives
Installation
Manual Configuration
Provisioning with Onboarded IT Backend
Local Management

Bootstrap Platform

IoT Platform

Attestation

Device Management

Installation Manual Configuration Provisioning with Onboarded IT Backend Local Management

Zero-Touch Bootstrapping (ZTB)

Zero-Touch Attestation (ZTA)

Zero-Touch Device Management (ZTD)

Zero-Touch Connection (ZTC)
The need to provide milli-second decision making at the edge

... using 5G connectivity, massive Machine-Type Communication (mMTC) & Ultra-Reliable Low-Latency Communication (URLLC) – together with secure IoT and high performance compute at the edge

Electric Power
- To enable a power substation to protect itself from a spike from the electrical grid backbone, it has less than 4 milliseconds

Manufacturing
- To enable a metal lathe to stop in time to avoid replacement when its bearings fail, there is only 1 millisecond

Surveillance - Security
- To enable a drone to have its HDTV camera feed instantaneously analysed by BI to determine the threat and next action

Repeatable Secure Solution
- The capabilities of URLLC and secure IoT together with compute at the edge are effective to solve the scenarios above and the needs of the 4th Industrial Revolution
Frictionless Trading between different organisations is complicated...

... because each industry, each company (& even LOB) has its own data models, technical dependencies and different articulation for handling pricing

... additionally each company (& LOB) has its own Legacy IT ERP or BSS... all of which have been customised! and each industry has its own “language”...

Most traditional company’s find it difficult to offer customers self-service for their own products and services...

...so to add in another company’s product and services into the mix in a self-service context is very difficult due to different data models, different technical dependencies for MACD and different articulation for handling pricing.
Successful Frictionless Trading between different organisations

... requires an overlay, abstraction & agnostic approach to enable companies to plug & play AND trade so that they can rapidly scale and accelerate their digital Smart offerings using a common language.

The system maintains each company's technical dependency rules and business pricing rules, enabling combinations of products and services to be exposed as self-service for customers – and providing billing and settlements.

Each company's offerings are overlayed and abstracted, articulating the technical dependency rules and commercial pricing rules into a common language.

Each company has its own data models, technical dependencies and different articulation for handling pricing.

Source: TM Forum, New Business Model Compendium
Initial ecosystem entities and roles for the Smart Adastral car parking ZTO scenario

- **Smart Adastral Customers**: Customers/Admin/Users
- **Smart Adastral Customers**: Admins
- **Smart Adastral Customers**: Users
- **Intel SDO Customers, Admins and Users**
- **BT Enterprise Tenant Operators**
- **BT Enterprise Tenant Operators**: Smart Adastral Channel Operators
- **BT Enterprise Tenant Operators**: BT Enterprise Channel Operators
- **BT Enterprise’s onboarded services / service providers**: ZTC, ZTA, ZTB, ZTD, Wi-Fi, LoRa, (5G?)
- **BT Enterprise’s onboarded resources / resource providers**: None?
- **Intel’s onboarded services / service providers**: Intel SDO rendezvous service
- **Intel’s onboarded resources / resource providers**: Intel SDO-ready NUC, Bosch Camera (with Arm), Raspberry Pi Camera

**Devices**

<table>
<thead>
<tr>
<th>Devices</th>
<th>Capabilities</th>
<th>Chargeable</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUC</td>
<td>Smart Gateway / Edge Device Wi-Fi, LoRa, (5G?)</td>
<td>NUC - one-off ZTO – MRC Network – Usage based</td>
</tr>
<tr>
<td>Cameras</td>
<td>SD, HD (to cloud) Wi-Fi, LoRa, (5G?) (to cloud) NPR, Queueing, Speed detection, Free parking spaces</td>
<td>Camera - one-off ZTO – MRC Apps</td>
</tr>
</tbody>
</table>
BT GS (USA) Marketplace – leveraging Infonova DBP

Flexible ZTA/B/C/D options to enrich the enterprise experience

Other manufacturer tenants are AD-Link (Camera & Applications), Future Robot (Camera & Applications), Bosch (Connected Devices & Applications) and Dell (Smart Gateway & Operating Systems)
[Not shown for the sake of clarity]
In this demo, the digital owner’s public key that is used in the order is the one that corresponds to BT’s DMS. In other demos, it will correspond to the DMS that is selected by the Enterprise customer.

Note: Keep all ZTO options in the UI and product configuration but default to the MVD choices (and only allow these choices) for now

Note: ZTA has a dependency on ZTD

- In the consumer scenario, the customer settles the bill with BT, while BT shares revenue with other partners
- In the enterprise scenario, the customer may need to settle the bill with BT and partners (e.g. arm for DMS), while BT and, in this case, arm share revenue with other partners
As the City of London Council, I want to “self-service order” a Zero-Touch bundle (order fulfilment phase – 1 of 2)
As the City of London Council, I want to “self-service order” a Zero-Touch bundle (order fulfilment phase – 2 of 2)

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© serviceIdentifier’s are correlated with serialNumbers

Triggers:
This ⭐ triggers ⭐

Customer
BT Smart City Portal
BT Enterprise Tenant
Intel Tenant
BT Service Orchestrator
Intel Service Orchestrator

BT DMS Extension
BT DMS
BT Bootstrap Server
Intel Device Order Gateway
Intel SDO

ZTA
- Transfer requested, ZTA order in progress
- Ownership transferred, ZTA order in progress
- Ownership claimed, ZTA order complete

ZTD
- ZTD order complete

ZTB
- ZTB order complete
As the City of London Council, I want to “securely zero-touch” set up and use my devices (establishment and operational phases)

Switch on devices

ZTC

Secure connection with access point/gateway

ZTA

Attestation handshake

Who is my owner?

Your owner is BT DMS (DMS Extension)

Attestation outcome

SDO action notifications

SDO usages

ZTB

Secure Bootstrapping (protocots, …)

ZTD

Secure connection with BT DMS (e.g. updates, reboots, status)

Device operation

Secure connection with IoT platform (sensing and actuating)

AWS IoT Platform

Secure connection with access point/gateway

ZTC usages {serviceIdentifier, mediationKeys, …}

ZTA usages {serialNumbers, spPrices, quantity, parameters, …}

ZTB usages {serialNumbers, spPrices, quantity, parameters, …}

ZTD usages {serviceIdentifier, mediationKeys, …}

AWS usages and billing is out-of-scope for the demo but can be folded into the ecosystem later

BT DMS Extension

BT DMS

BT Bootstrap Server

BT Network OSS (e.g. Wi-Fi)

Intel SDO

Intel Tenant

Intel Service Orchestrator

BT Service Orchestrator

BT Enterprise Tenant

Access Point/Gateway

BT Network OSS (e.g. Wi-Fi)

Access Point/Gateway
Zero-Touch-Onboarding high level deployment architecture

Cloud-native and event-oriented micro-services architecture based on the digiglu digital experience framework
Questions

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Traditional industries are moving their products and services to be Smart “end-to-end solutions” … by applying eSIM’s or IoT devices to physical goods, this implies a need for organisations to combine different components to deliver end-to-end solutions, anticipating a “Digital Business Marketplace”
The global Digital Business Marketplace

... enabling companies to be a part of a frictionless trading global ecosystem
B2B2X in an IoT ZTO context

- B2B2X will allow businesses to aggregate a complex mix of IoT products and services (e.g. data hub services, edge computing, devices, connectivity, apps) from large numbers of partners
- TMF catalyst initial partners/prospects – AFG, Arm, AWS, BearingPoint, Digiglu, DT, Intel, Nokia, NTT, Salesforce, T-Mobile
Minimise the ZTA/B/C/D options to simplify the consumer experience.

Other manufacturer tenants are AD-Link (Camera & Applications), Future Robot (Camera & Applications), Bosch (Connected Devices & Applications) and Dell (Smart Gateway & Operating Systems) [Not shown for the sake of clarity]
Demo Architecture – Digital Orchestration Layer

To prove out the workflows and partnering repeatability, a lightweight approach was taken to deliver the demo in 5 weeks.
Demo Architecture – Digital Experience Layer

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Questions