CENTRE FOR DEVELOPMENT OF TELEMATICS

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C-DOT's oneM2M based IoT Platform

CCSP- C-DOT Common Service Platform

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Outline

- Common service functions supported by CCSP
- Advanced features supported
- CCSP Portal applications
- CCSP Onboarding
- Application integrated on CCSP
- Participation in events with CCSP
- Multiple vertical interaction use case

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IoT solution Components

All IoT solutions are assembled from several components. These include

1. Connected devices
2. **IoT Platforms**
3. Analytical tools
4. Software applications
5. Visualisation dashboards

An IoT platform provides the glue to join different IoT component technologies.

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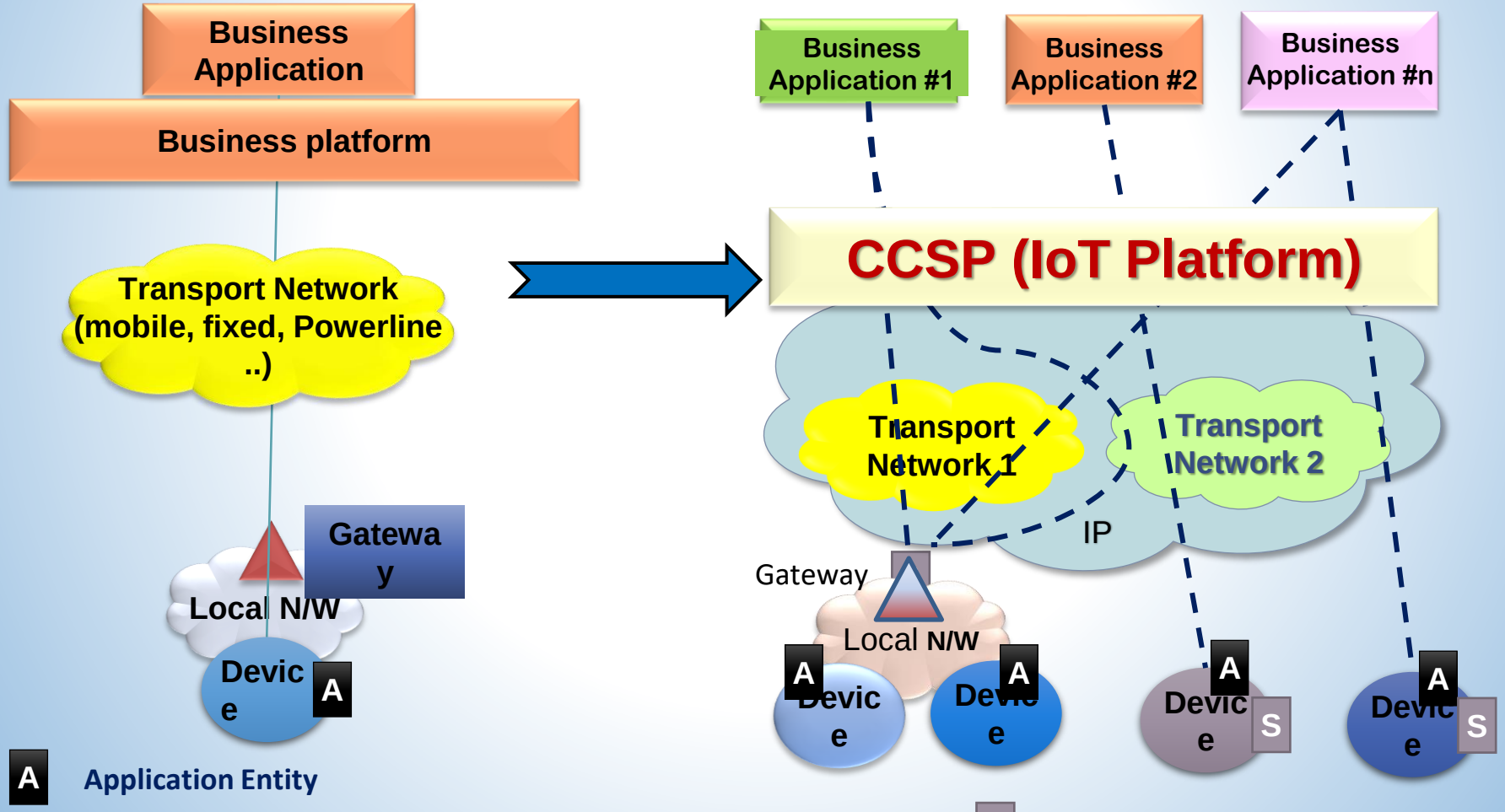
Pipe (vertical):
1 Application, 1 NW,
1 (or few) type of Device

Horizontal (based on common Layer)
Applications share common infrastructure, environments, network elements & data



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C-DOT's IOT Platform

C-DOT has developed a oneM2M standard based IoT platform - CCSP .

C-DOT Common Service Platform

India's first indigenous standards based IOT Platform

- **CCSP (IoT platform)** allows any IoT application to discover and interact with any IoT device (based on the defined access control policies)
- This increases reusability of devices and data , thus reducing cost of deployment and maintenance.
- Also, when deploying standard based IoT platforms in the IoT ecosystem the application provider does not have to modify its IoT Application to use specific APIs of the IoT platform provider , when it goes from one deployment to another deployment across locations/city/state etc..

C-DOT Common Service Platform - CCSP

- oneM2M standards based Common Service layer/ Middleware
- Enables standards based M2M communication.
- Caters to the common requirements of the M2M applications across various verticals/industries like transport, health , water and electricity etc.
- Allows interoperability by acting as a service between the data collection/acquisition and the data consumer applications

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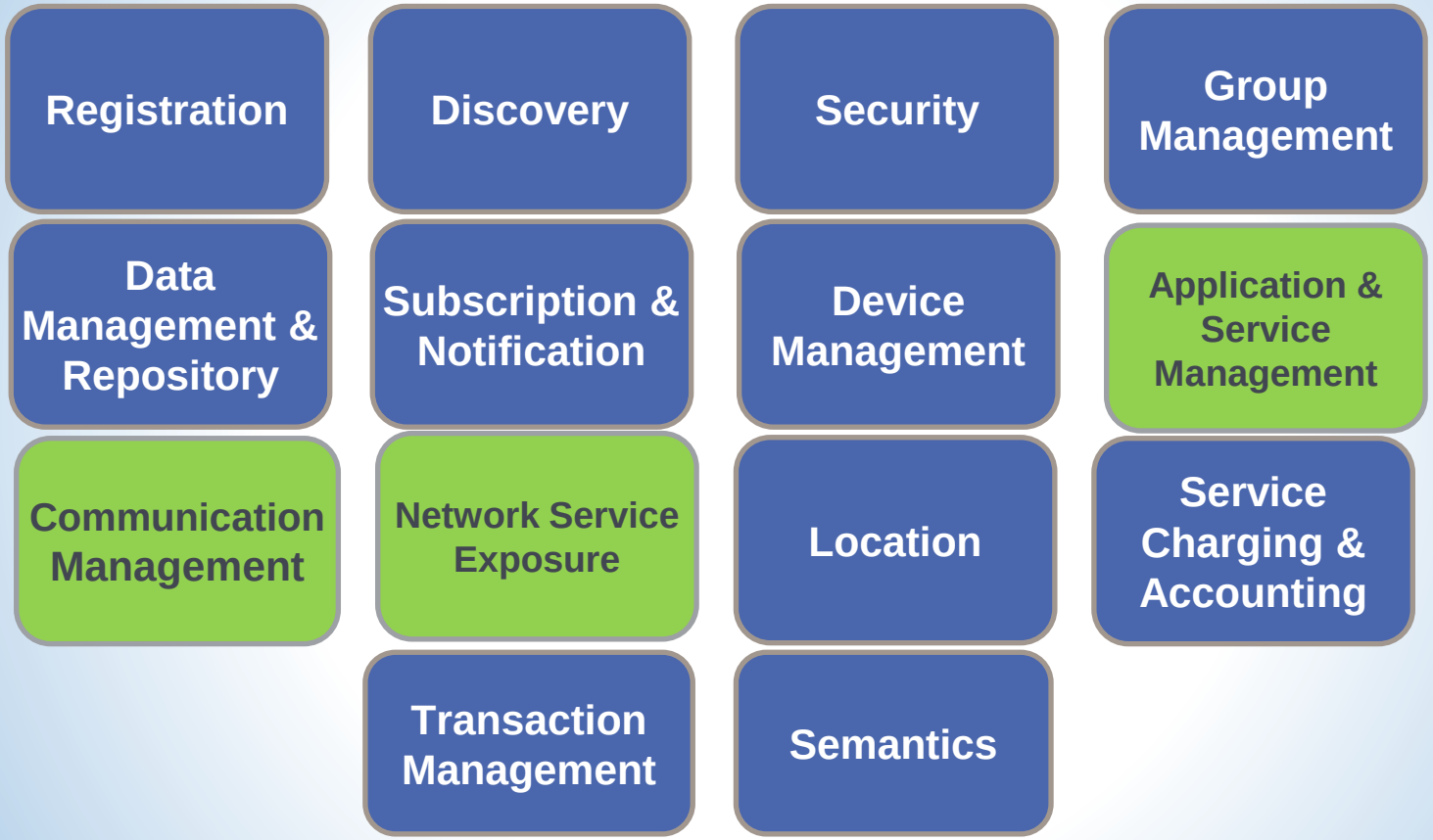
CSFs implemented in CCSP



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CCSP Key Highlights

- Compliant to oneM2M Release 3 Specification with support of some advanced release 4 features
- Supports 11 Common Service Functions (CSFs)
- Supports PSK and Certificate based TLS Security
- RESTful resource oriented APIs
- XML & JSON data format support
- HTTP, CoAP and MQTT protocol binding support
- Advanced functionalities Support

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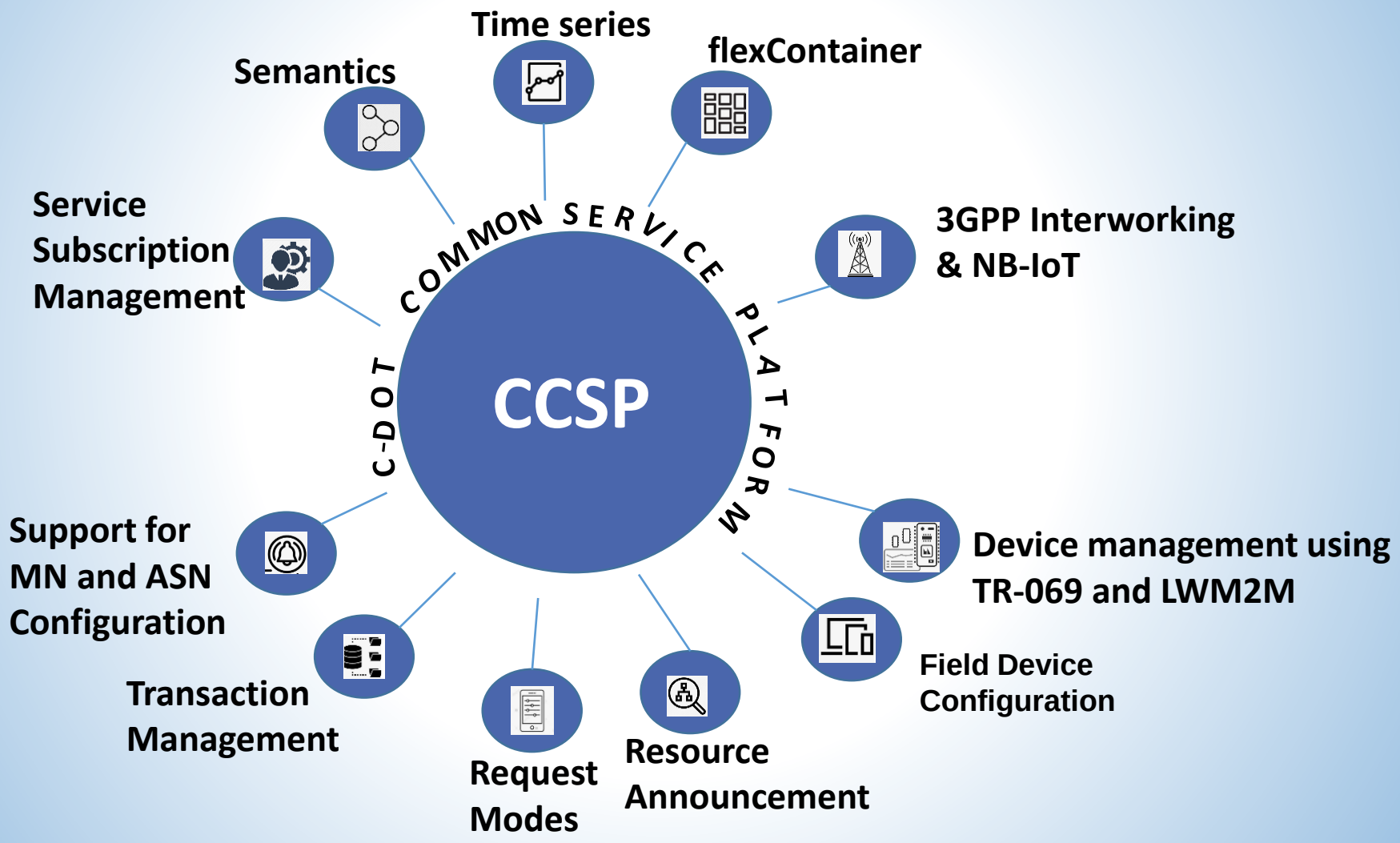
CCSP Advanced Features



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oneM2M Release 4 features supported by CCSP

- Primitive Profile – to enable Non IP Data Delivery , as it reduces the payload size.
- Service restrictions
- Service subscription linking for field nodes

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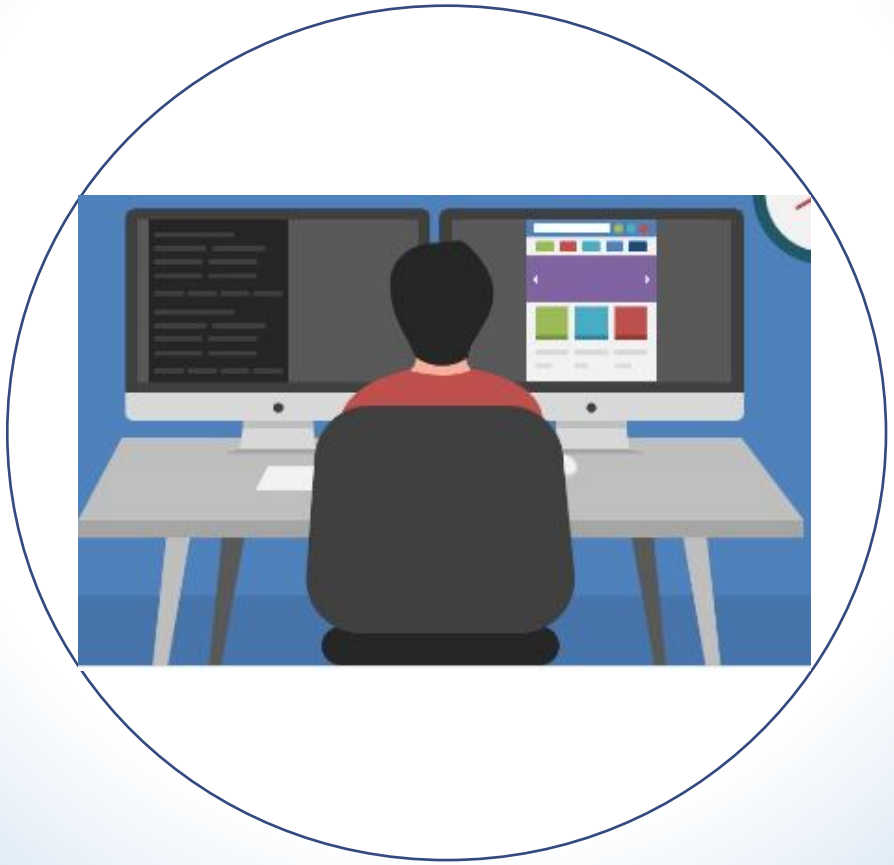
Portals for M2M Application Providers

- IoT/M2M Industry Partner Engagement
- User and Role Management
- Service Subscription Management



- Resource Tree Viewer
- Network Management
- Application Resource Management

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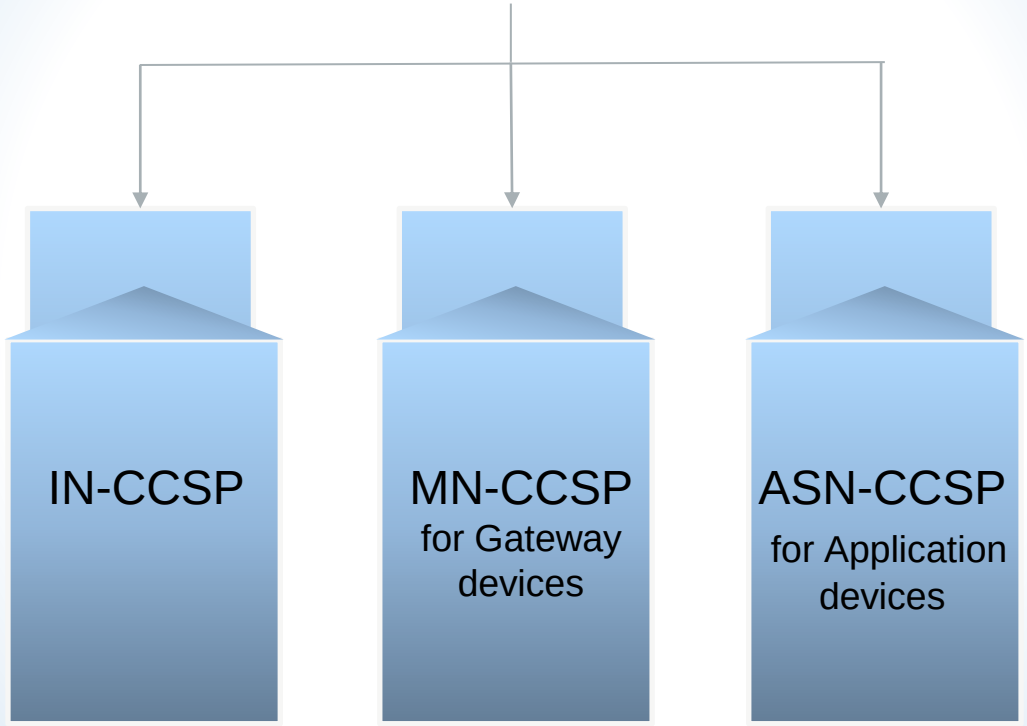
CCSP (C-DOT Common Service Platform) Solution Set

What we offer?



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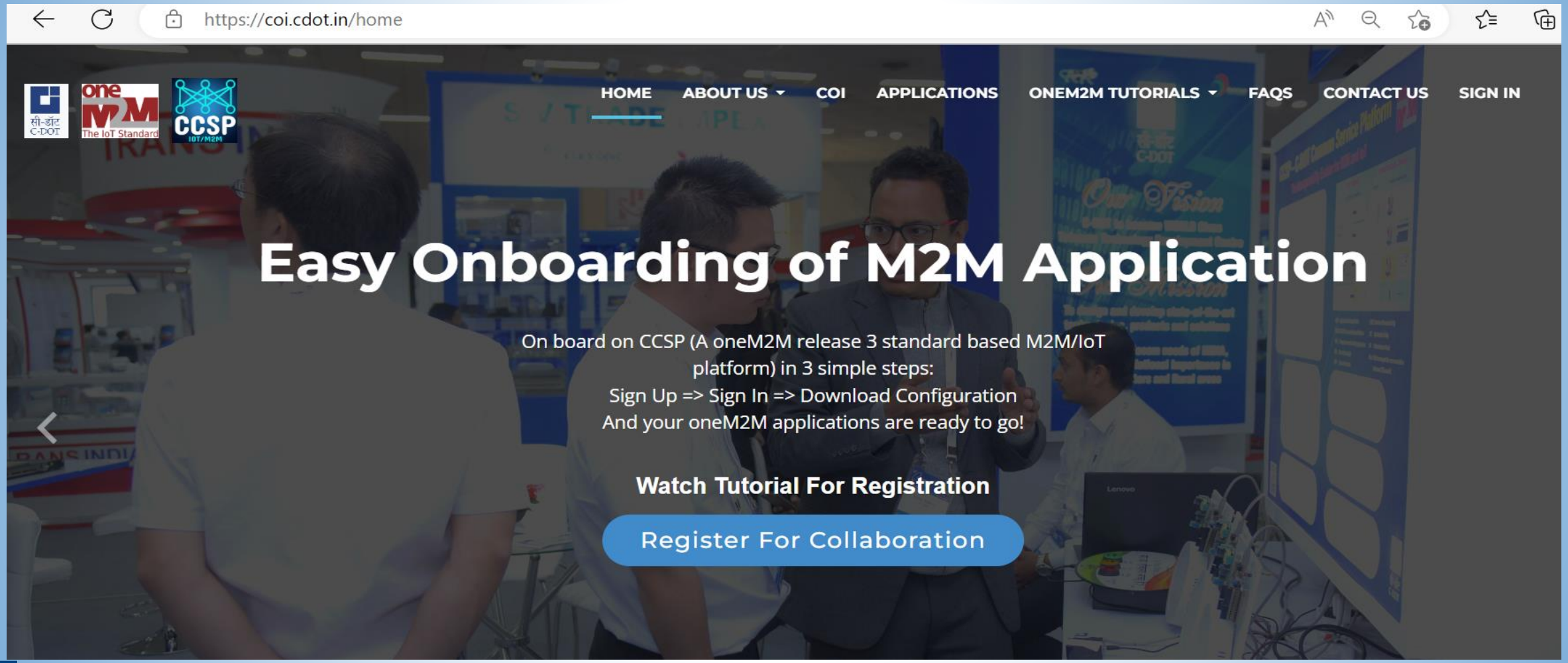
Onboarding on CCSP



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Benefits of CCSP

- Since it is based on oneM2M , it gets the benefit of the evolution of its features based on the collaborative efforts of the experts from around the world , thus the common problems being faced in IoT industry will be addressed faster.

- It benefits the procurement agencies by offering the ability to commission multi stage projects without locking into a single technology or vendor from the outset.

- Using CCSP , IoT solutions can interoperate across silo boundaries, bringing out innovative solutions .

- This is ideal for distributed and cooperative solutions in the areas such as smart buildings , smart cities, intelligent factories etc.

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CCSP & Events

4

No. of oneM2M Developer Events and Workshops organized by C-DOT to disseminate knowledge on oneM2M based applications

6

oneM2M Interop Events attended and Interoperability tests and Conformance tests done

12

Organizations with which CCSP's Interoperability has been tested

20

Demonstration with CCSP using various applications such as smart living, fire safety , traffic control etc.

35

Registration for collaboration by various IoT/M2M Application providers

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Applications supported on CCSP

Developed in-house and Deployed in C-DOT Campus	Developed in-house (Prototype)	Assisted partners to develop (Deployed in C-DOT)	Assisted partners to develop
• Smart Living Application involving Temperature, Humidity and Power monitoring & HVAC Control • Canteen Feedback System, • Vehicle Management, Emergency Alarm • Patient Tracker	• Smart Street Light Application (both LoRa and 6LowPAN based) • LoRa based patient Quarantine	• Fire Safety and healthiness monitoring application	• Traffic Light Control and Monitoring application – with CDAC

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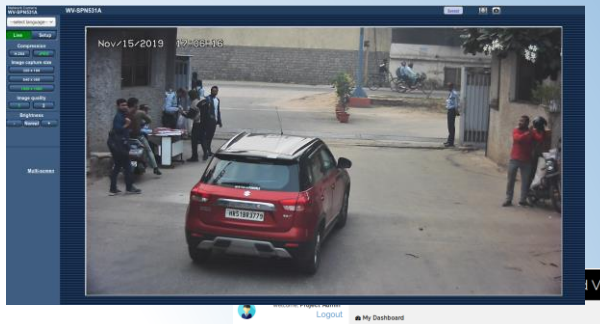
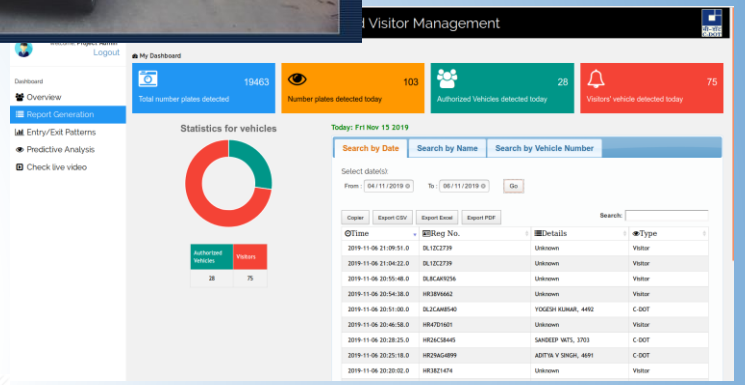
Smart Vehicle & Visitor Management





Mobile app replaces manual entry register

Reads number plate of vehicles

Interacts with camera to get vehicle numbers in real time

Sends info to oneM2M platform

CCSP

Admin user can view dashboard

Sends notification to mobile app for mismatch of vehicle number in database

Sends command to boom barrier actuator

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CDOT Contribution to oneM2M:Roles, Positions

- SDS WG Vice Chair
- Marcom Vice Chair
- Field Device Configuration (oneM2M TS-0022) Rapporteur
- Part of ETSI oneM2M Task Force for Release 4 Conformance test development
- oneM2M Conformance Test suite (oneM2M TS-0018) Rapporteur

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CDOT Contribution to oneM2M: Technical Plenary and Web meetings

C-DOT is contributing in the M2M standardization process by actively participating in oneM2M meetings.

- TP-25 (at ETSI, Sophia Antipolis, France, Oct 16)
- TP-31 (at Bangalore, India, Sep 17)
- TP-35 (at ETSI, Sophia Antipolis, France, May 18)
- TP-39 (at Malaga, Spain, Feb 19)
- TP-42 (at Hyderabad, India, Sept 19)
- TP-46 to TP 56 (Virtual and Hybrid TP Meetings)
- TP 57 (at South Korea, Nov 22)

440 Agreed Contributions

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oneM2M Interoperability Test event participation

CCSP Interoperability testing was held with

- Interdigital, USA
- LAAS-CRNS, France
- HPE, USA
- NTT – Japan
- KETI, Korea
- DEKRA - Germany
- III – Institute for Information Industry
- Sejong University
- SyncTechno, Korea
- ACME

Conformance testing of CCSP with ETSI and Spirent

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CDOT Contribution to oneM2M: Events



- Hosted 2 Developer Events in Delhi, 2017 and Bangalore,2019 - About 25 S/W companies comprising of C-DAC and BEL participated in the 2nd oneM2M Developer event.
- Hosted 2 IoT standardization workshop in C-DOT Delhi Campus, 2017 and 2019
- Presented oneM2M platform based solution in ETSI, France
- Participated in IOT exhibition in Singapore

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Other Contributions

- The Common Service Layer Standard P Draft was released in BIS LITD/28
- Submitted recommendations for Standardisation as part of the Intelligent Transportation Committee in Niti Aayog.
- Contributions in various technical Reports released from TEC
  - Gateway and Architecture
  - 13 digit numbering plan for M2M communication
  - Communication Technologies in M2M / IoT domain
  - Recommendations for IoT / M2M Security
  - Finalising IoT standards for Smart Cities
  - Adoption of oneM2M as National standard
  - IoT Experience Centre in TEC
  - Security by design principle and National Trust Centre for IoT

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THANK YOU

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