

**Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)**

**Submission Title:** China Telecom Response to 15.7r1 CFA

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Voice:

**Re:**

**Abstract:**

**Purpose:** Call for Applications Response

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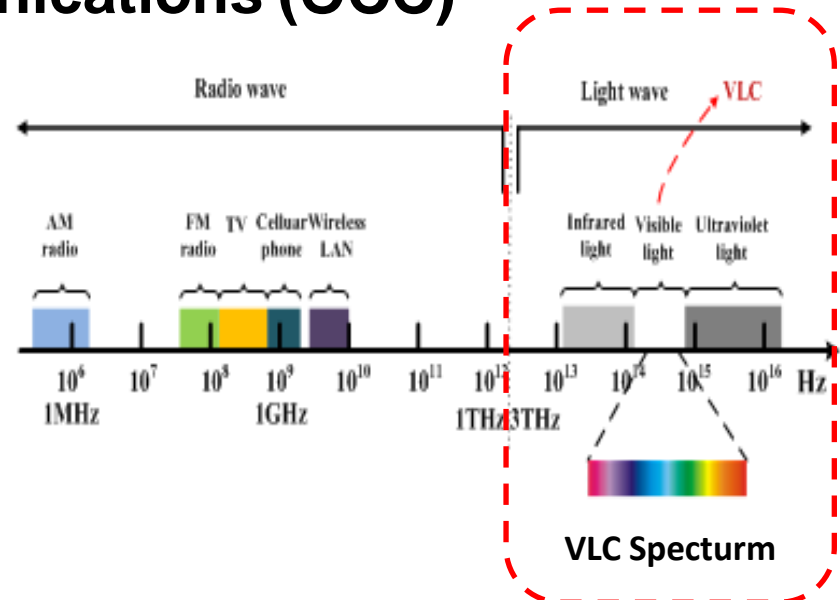
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# China Telecom CFA Response for Optical Camera Communications (OCC)

Visible Light Communication , VLC refer to establishing communication through visible light spectrum.

## Advantages

- ✓ Low cost , Low power consumption
- ✓ Interference Free
- ✓ Bandwidth un-licensed
- ✓ Can integrate with lighting and display industry



	Frequency	Typical Bandwidth	Max Data Rate	Pros	Cons
<b>VLC</b>	400-800THz	90M/400M	15Gb/s (LiFi)	Security RF interference Free Un-licensed	Directional Block New Industry Chain
<b>WIFI</b>	2.4GHz, 5GHz	20M/80M	1Gb/s	Low cost Easy deployment Mature Industry	Less Secure RF Interference User number limited
<b>4G</b>	1.9GHz-3.8GHz	20M	100Mb/s	Flexible connection Coverage	RF Interference Low data rate

# China Telecom CFA Response for Optical Camera Communications (OCC)

Possible OCC applications:

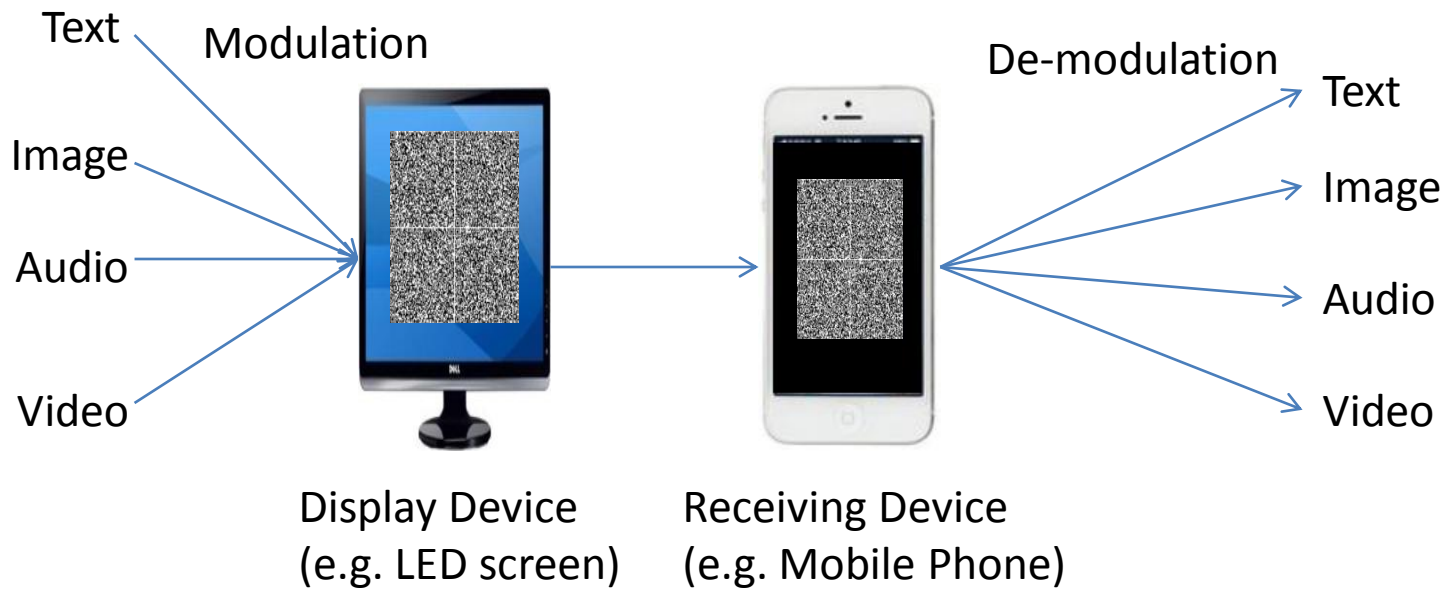
- Data Transmission
- Positioning and Navigation (Indoor)
- Pattern Recognition
- Assets Tracking
- ...

# China Telecom CFA Response for Optical Camera Communications (OCC)

## Deployed Applications

# China Telecom CFA Response for Optical Camera Communications (OCC)

## OCC Data Transmission



## QR Code Tourist Information System



# China Telecom CFA Response for Optical Camera Communications (OCC)

## Pattern Recognition



**Camera Input**



**Upload/Search**



**Results**

Pros:  
High recognition success rate for plant, fruit, drinks etc.

cons:  
Low recognition success rate for color object, e.g. race recognized as tiles

### Ability :

- ① Mobile Device
- ② APP

- ① 3G/4G/WiFi
- ② Backend Search

- ① 3G/4G/WiFi
- ② Push

### Network Related :

- ① Mobile Device
- ② APP Functions ( e.g. Twitters )

- ① 3G/4G/WiFi
- ② Cloud
- ③ Big Data

- ① 3G/4G/WiFi
- ② Ad Push
- ③ Value Added Service

# China Telecom CFA Response for Optical Camera Communications (OCC)

## Pattern Identification



Original



Noise Reduction



Pattern



Identification

01021...



Identification ID

## Core Process



01021...



01021...

02521...

06821...

05671...

01021...



Output:

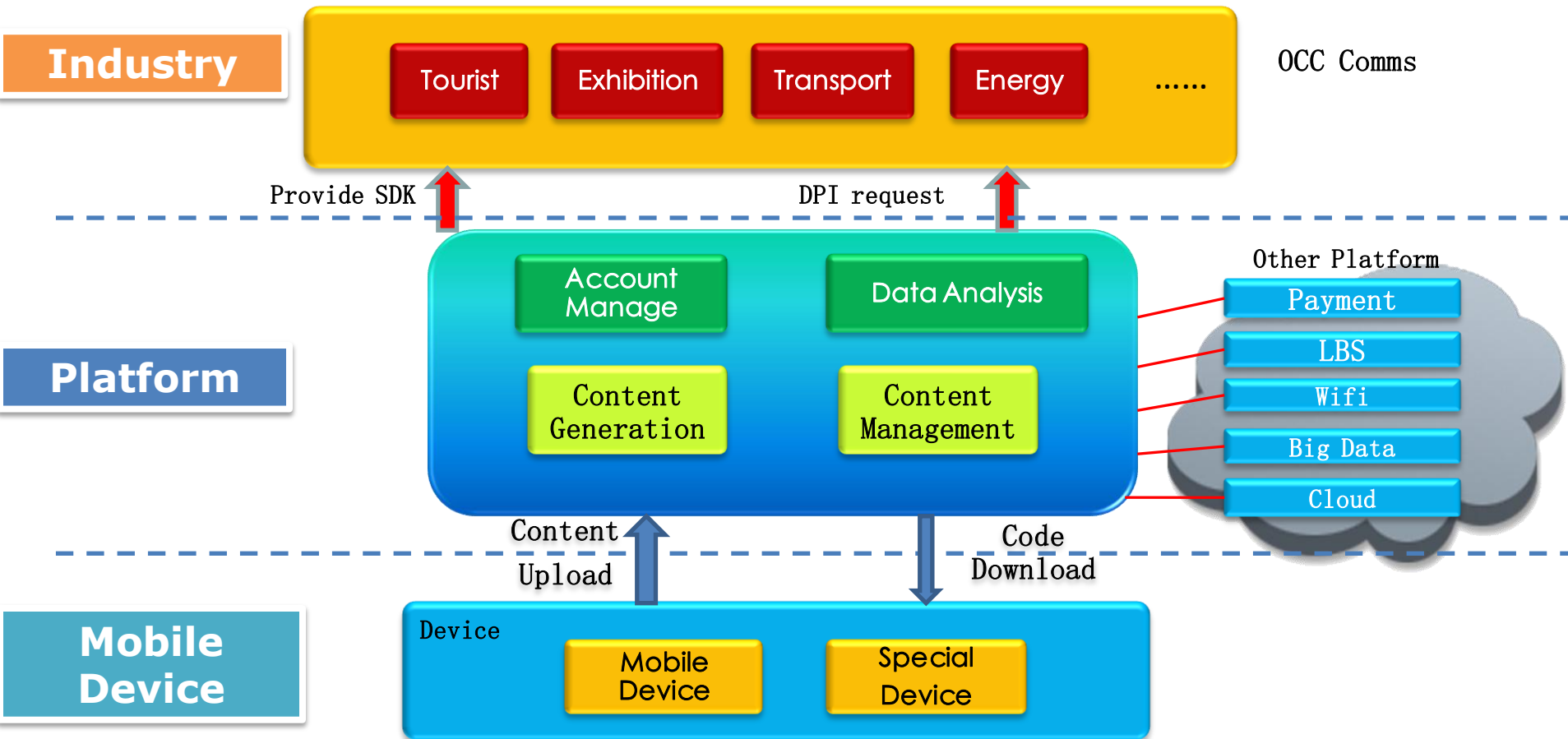
- ① Car
- ② White Car
- ③ Sports Car

## Specs:

- 1. Identification Speed (30Frame/s, PC)
- 2. Success Rate (80-90%)
- 3. Define Database (e.g: Plant, Building, Human etc)
- 4. Identification ID non reversible (Original image non recoverable but comparable)

# China Telecom CFA Response for Optical Camera Communications (OCC)

OCC Platform





# **Desired OCC Standard Technical Features from China Telecom**

China Telecom is requesting that ...

1. The standard provide at least one OCC PHY mode that support vlc device power consumption monitoring and provide management abilities.
2. The standard provide at least one OCC PHY mode that support multi-data rate transmission, e.g low data rate, normal data rate and high data rate.
3. The standard provide the minimum requirements for manufactured devices to be graded as meeting the IEEE802.15.7 OCC level of compliance, in term of connection speed and functionalities, e.g. OCC – basic, OCC – standard, OCC – advanced etc.

# Questions?