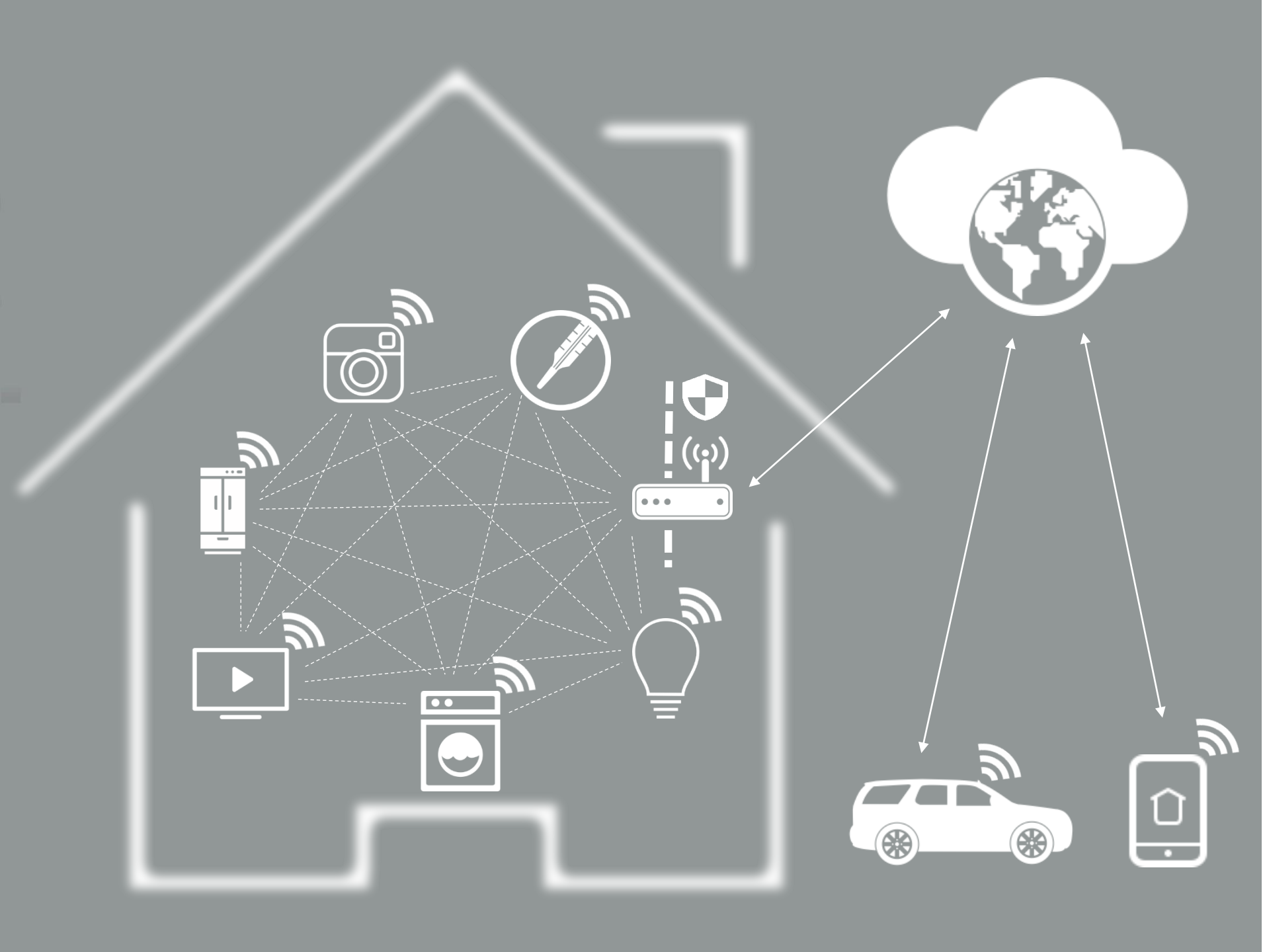
Blockchain Powered Internet
&
Elastos Runtime

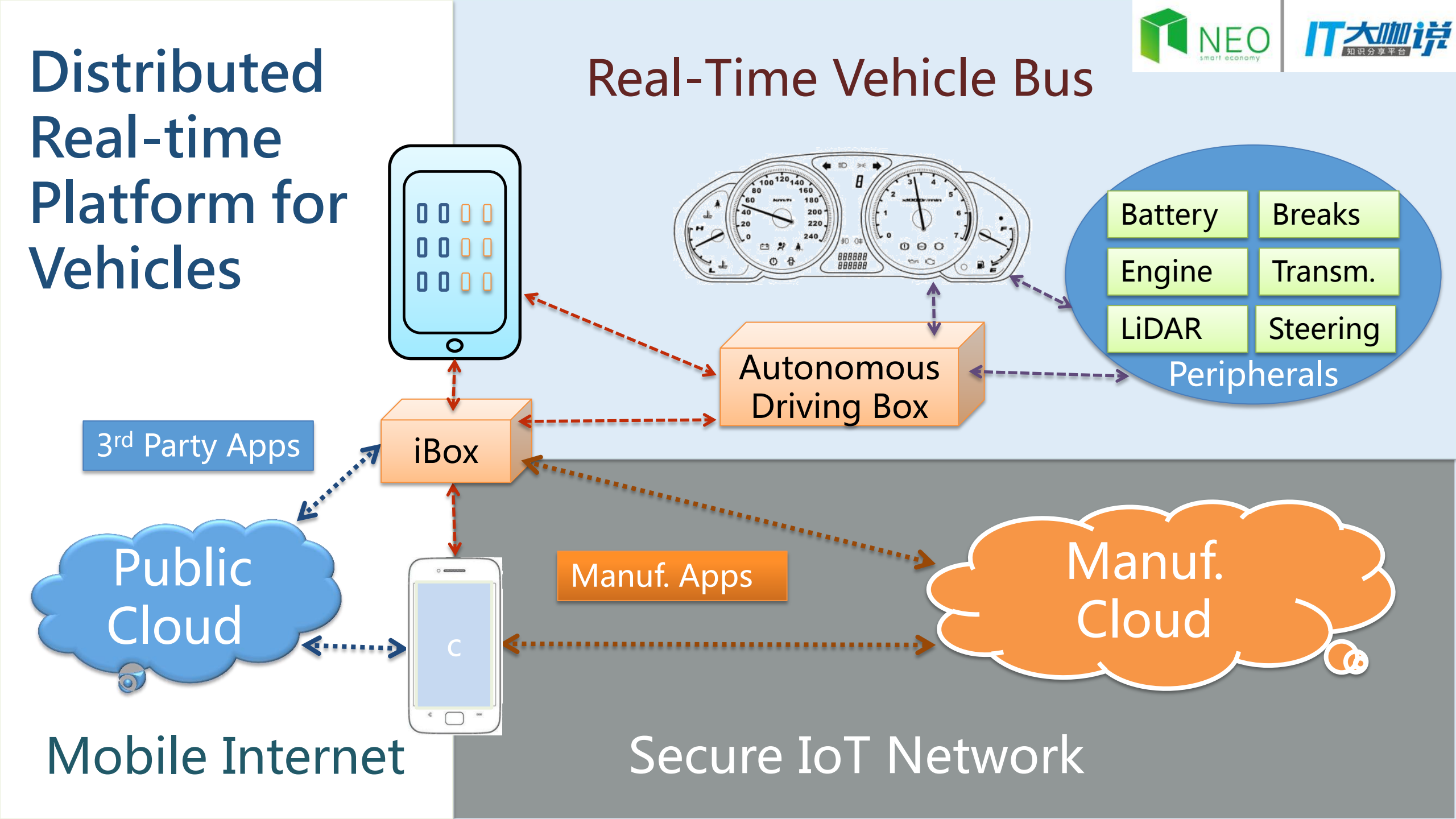
August 12, 2017



IoT Challenges

1. Security and Safety
2. Embedded and Real-time
3. Distributed and Decentralized
4. Main Stream Programming
5. User Content Monetization

Distributed Real-time Platform for Vehicles



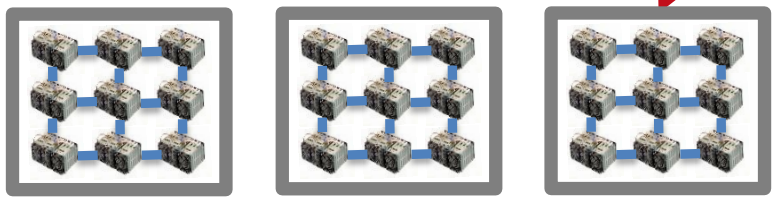
A Decentralized (Server-less) App Scenario

Instant app without intermediaries

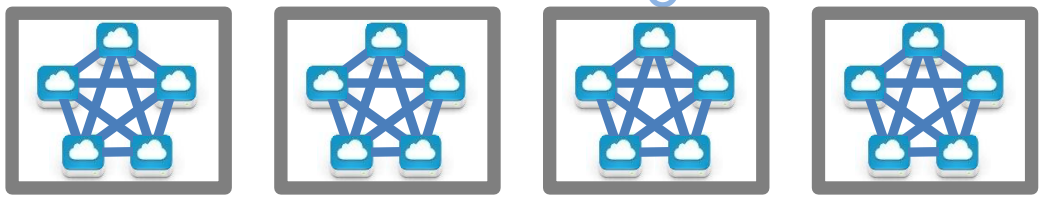
pay

Elastos Network

Connect the virtual & physical world



Blockchain Computers

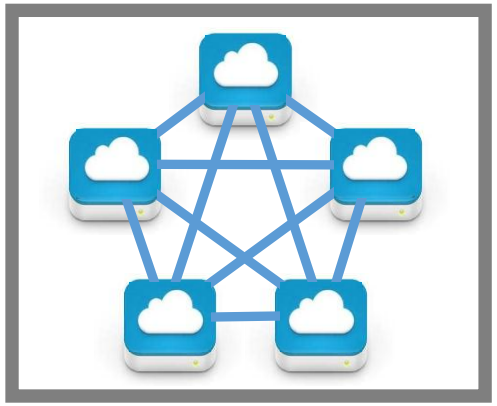


Mobile & IoT Devices Run on Elastos Carriers

End-to-End Solution for a Safer Cyberspace

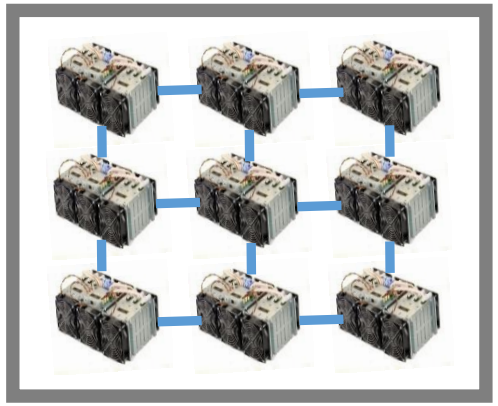
Definitions of Elastos & Blockchain Computers

Decentralized Personal Clouds



- A Van Neumann machine, with cloud mass storage and local HD as cache, is an Elastos computer;
- An Elastos carrier consists of a peer-to-peer network of Elastos computers ;
- Apps execute inside VMs on an Elastos computer of an Elastos carrier.

"Decentralized" Blockchains



- A blockchain is really a blockchain computer;
- The peer-to-peer network of a blockchain computer is merely an internal bus;
- Apps of a blockchain computer are called smart-contracts or "DApps".

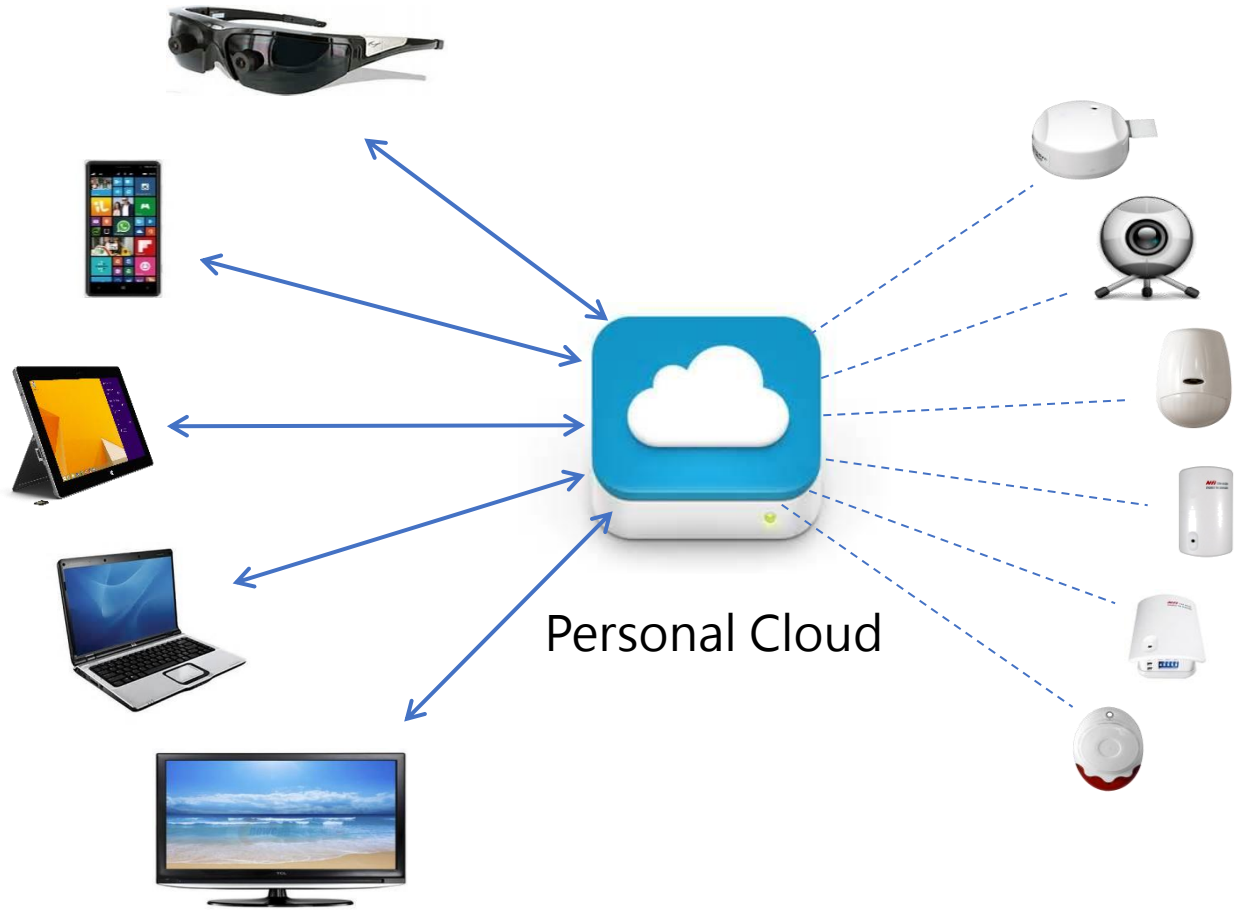
Distributed Computing

(the computation power
is more than a single node)

Duplicated Computing

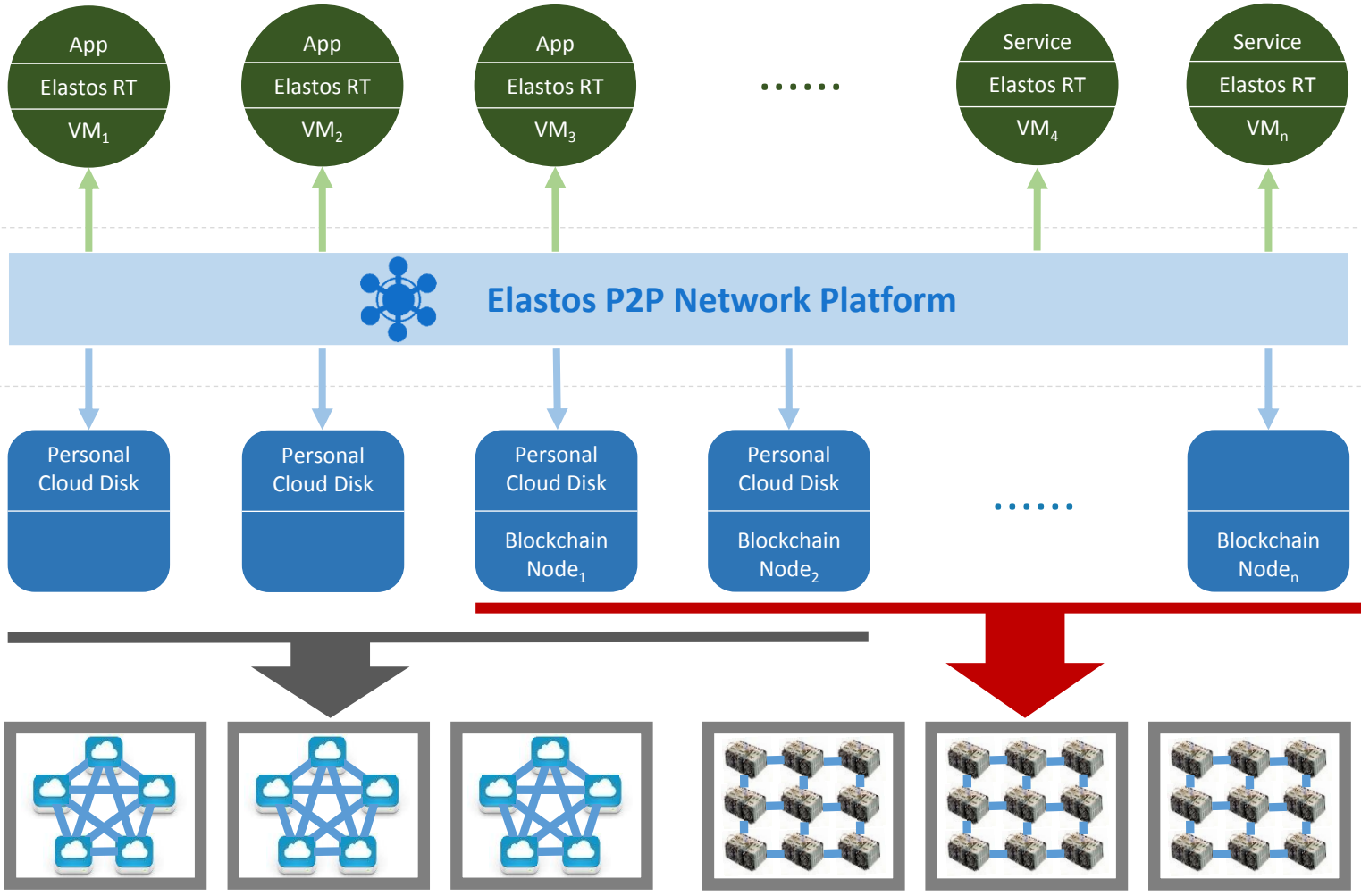
(the computation power
is less than a single node)

What is an Instant (Universal) Application



- Same app for all smart terminals;
- Cloud storage for all apps;
- IoT devices as peripherals (no Internet);
- Apps access IoT devices via Web services;
- Languages inter-operate automatically;
- No OS runtime fragmentations.

Building a Decentralized Internet Platform



Virtual Machines

The Network is the Computer:
Unified Blockchain &
IoT Peer-to-Peer Network

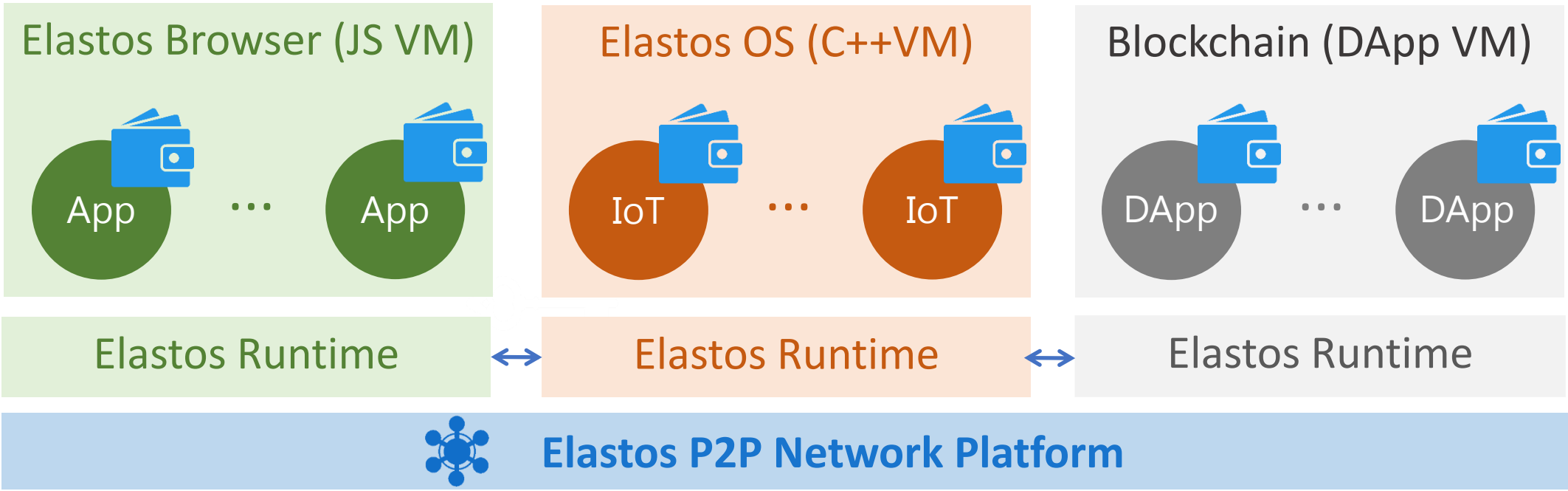
Physical Computers/Nodes

P2P Networks/Carriers

Blockchain as a Service

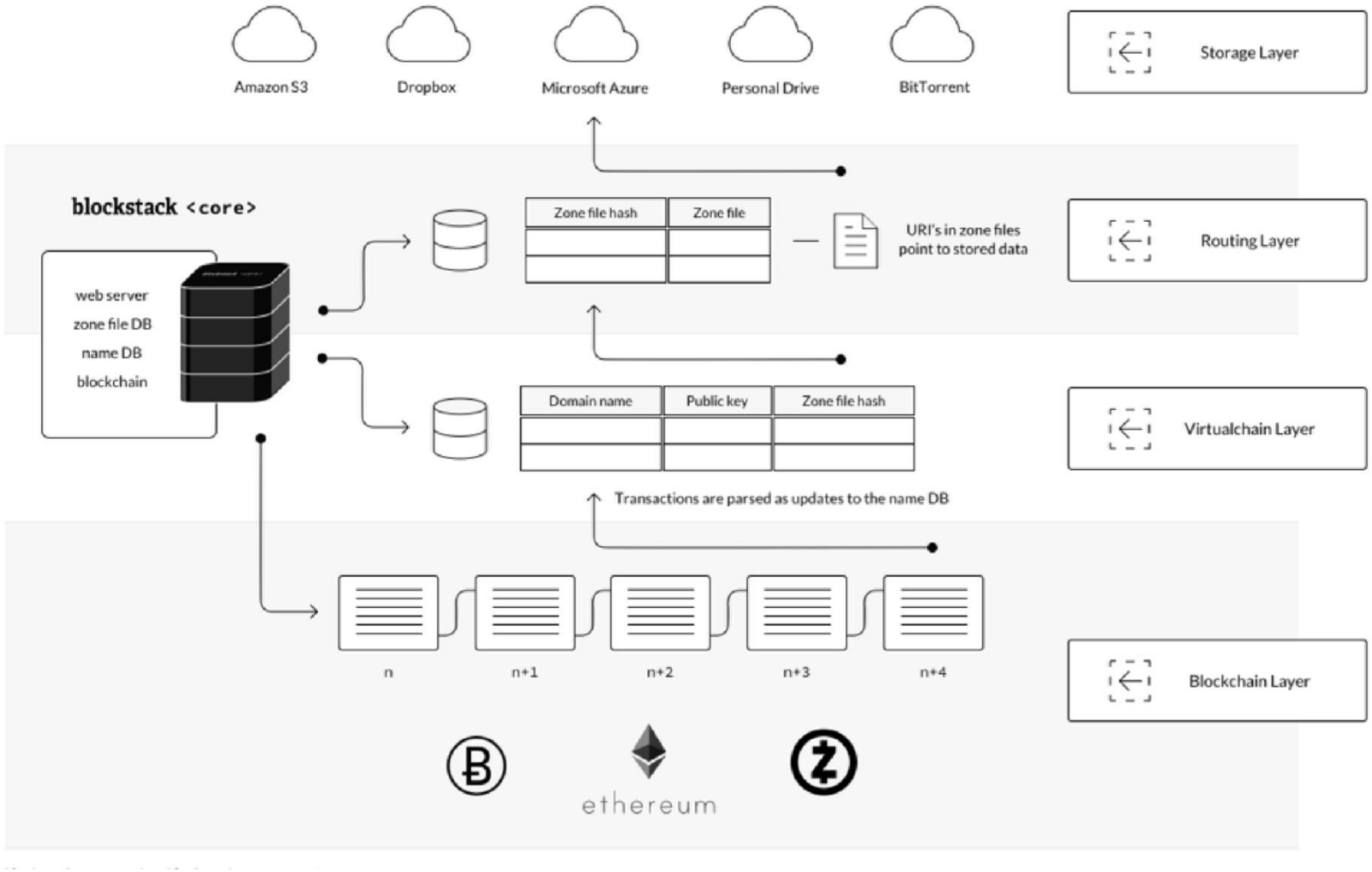
ELA Blockchain is the TrustZone

Creating Scarcity of Digital Contents



- Blockchain solved the property right authentication problem;
- An unified runtime VM is the key for digital content execution.

You Own Your Own Data (Blockstack)



Decentralized Apps Planned on Blockstack:

- Voting
- Marketplaces
- Identity verification
- Crowdfunding
- Messaging
- File sharing
- Document signing
- Video sharing
- Decentralized Reddit
- Decentralized Twitter

Blockstack.org

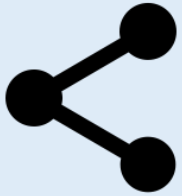
Three Open Source Projects of Elastos

Applications

Personal Clouds/Portals

Apps/Services

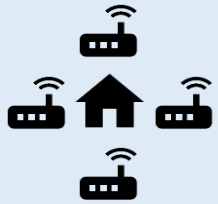
Social Groups/Consortiums



The Platform

Elastos Runtime

Elastos P2P Network

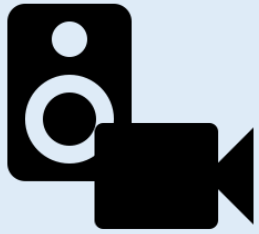


Elastos Blockchain

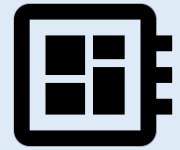
IoT Devices

Smart Terminals

IoT Gateways

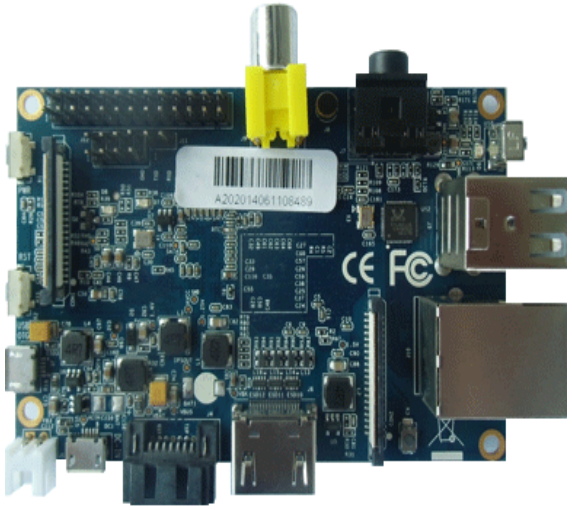


IoT Devices



IoT Sensors

Elastos 2015

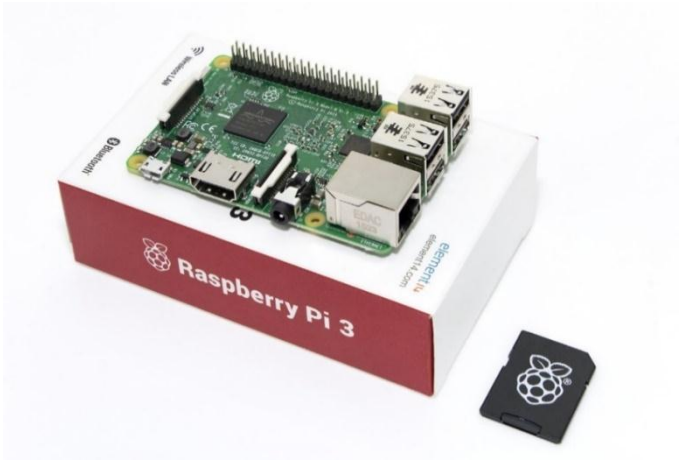


Elastos on Banana Pi

Elastos Smart-Router

Elastos 2016

Elastos Smart-Phone
XT1085



Elastos on Raspberry Pi 3

Android-Like Programming in JS, Java & C/C++


Launcher


Settings


Pinyin IME


Calculator


Dialer


Browser


Files


Calendar


Contacts


Messages


Music

Goal: Elastos + RT Kernel = RT Android

- Self Contained C/C++ Native API
  - Rewrote more than two million lines of Android Java Framework code;
- Facilitates Universal Apps
  - C/C++, Java, JS programs call each other without resorting to JNI;
- Unifies Local and Web Services
  - Loosely coupled and on-demand loading services across the Internet;
- Hides All IPC, Internet and IoT Protocols
  - Network-agnostic model prevents DDoS attacks and privacy leaks.

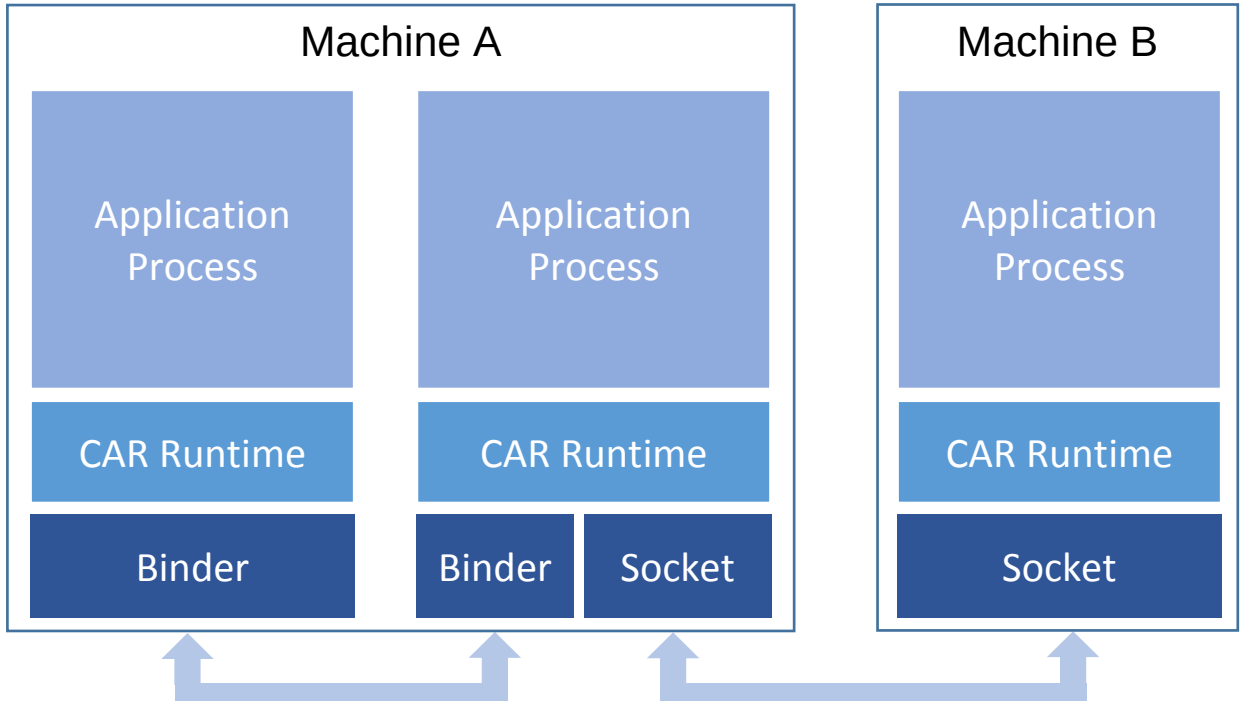
Windows UWP vs. Elastos Runtime

Key Points	Windows UWP	Elastos
Programming Runtime API	WinRT API based on COM/C++	ElastosRT API based on CAR/C++
Primary Programming Languages	C/C++, C#, VB, JavaScript	C/C++, Java, JavaScript
Application Framework	Unified Native Framework (.NET)	Unified Native Framework (Android)
UI Rendering	XAML	XML
Screen Size Adapting	Wide, Middle, Narrow	mdpi, hdpi, xhdpi, xxhdpi
IoT Framework	AllJoyn	AllJoyn

Note: UWP stands for Universal Windows Platform, the Microsoft terminology of universal apps.
COM stands for Component Object Model, a Microsoft Component/Service technology.
CAR stands for Component Assembly Runtime, an Elastos technology for SaaS programming.

Elastos Programming in C/C++

- Based on homebrew CAR (Component Assembly Runtime) technology, Elastos supports SaaS programming in native code;
- Interface oriented and event driven;
- Binary file format .eco is .so plus .cls;
- Utilizing .cls to cross language and network barriers:
  - ✓ No more JNI;
  - ✓ No more proxy/stub;
  - ✓ Write once, run everywhere.



Elastos Code Snippets

```
var eventHandler = {
   OnEvent:function(i) {
      var s = 'call OnEvent, i: ' + i;
      elastos.log(s);
   }
};

var module = elastos.require('Demo.eco');
var demoObj = module.createObject('CDemo');
demoObj.addEventHandler(eventHandler);
demoObj.doTask();
```

JavaScript

Demo.eco

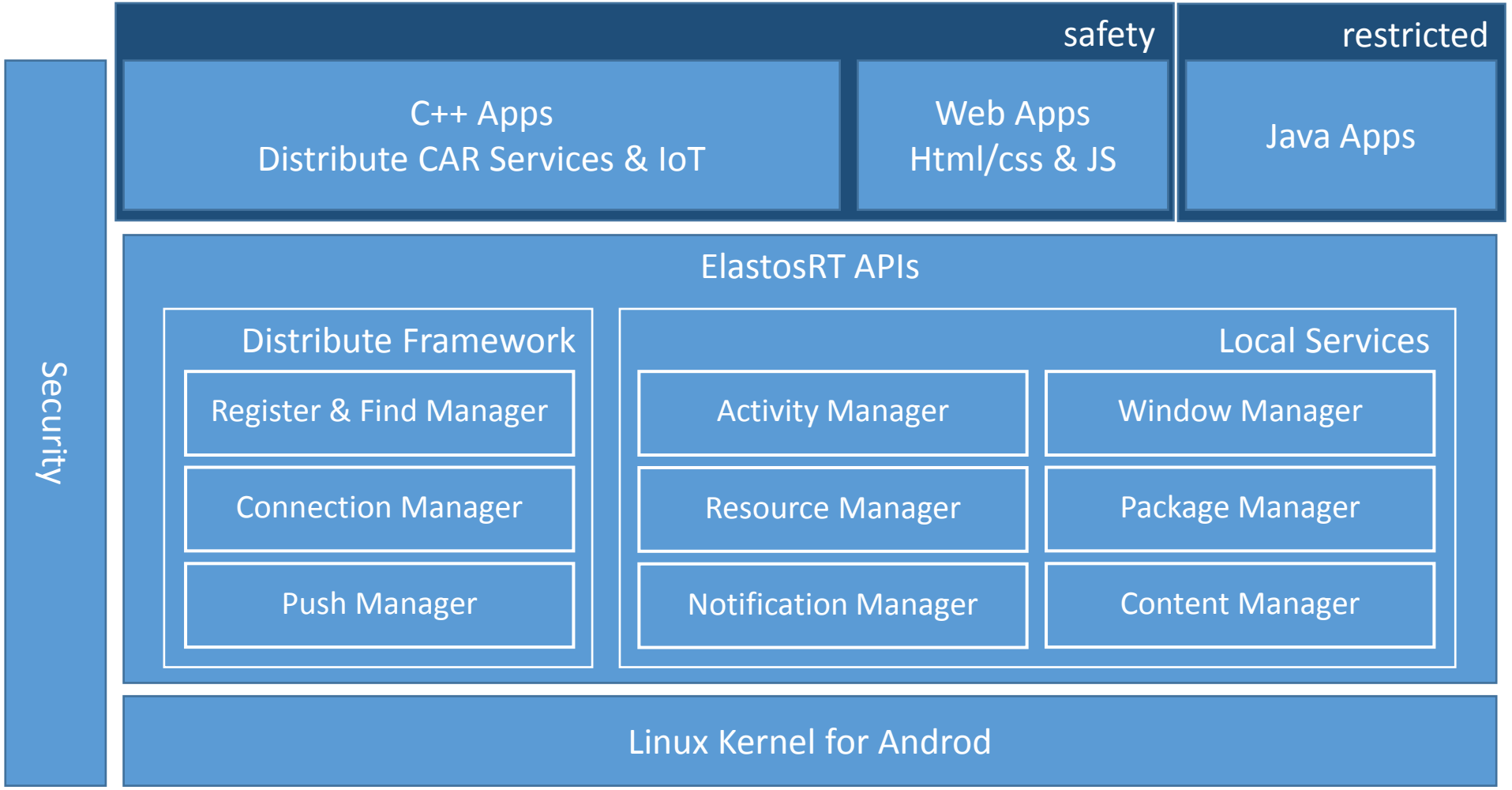
```
Module
{
   interface IEventListener {
      OnEvent(
         [in] Int32 id);
   }

   interface IDemo {
      AddEventHandler(
         [in] IEventListener* listener);

      DoTask();
   }

   class CDemo {
      interface IDemo;
   }
}
```

Demo.car

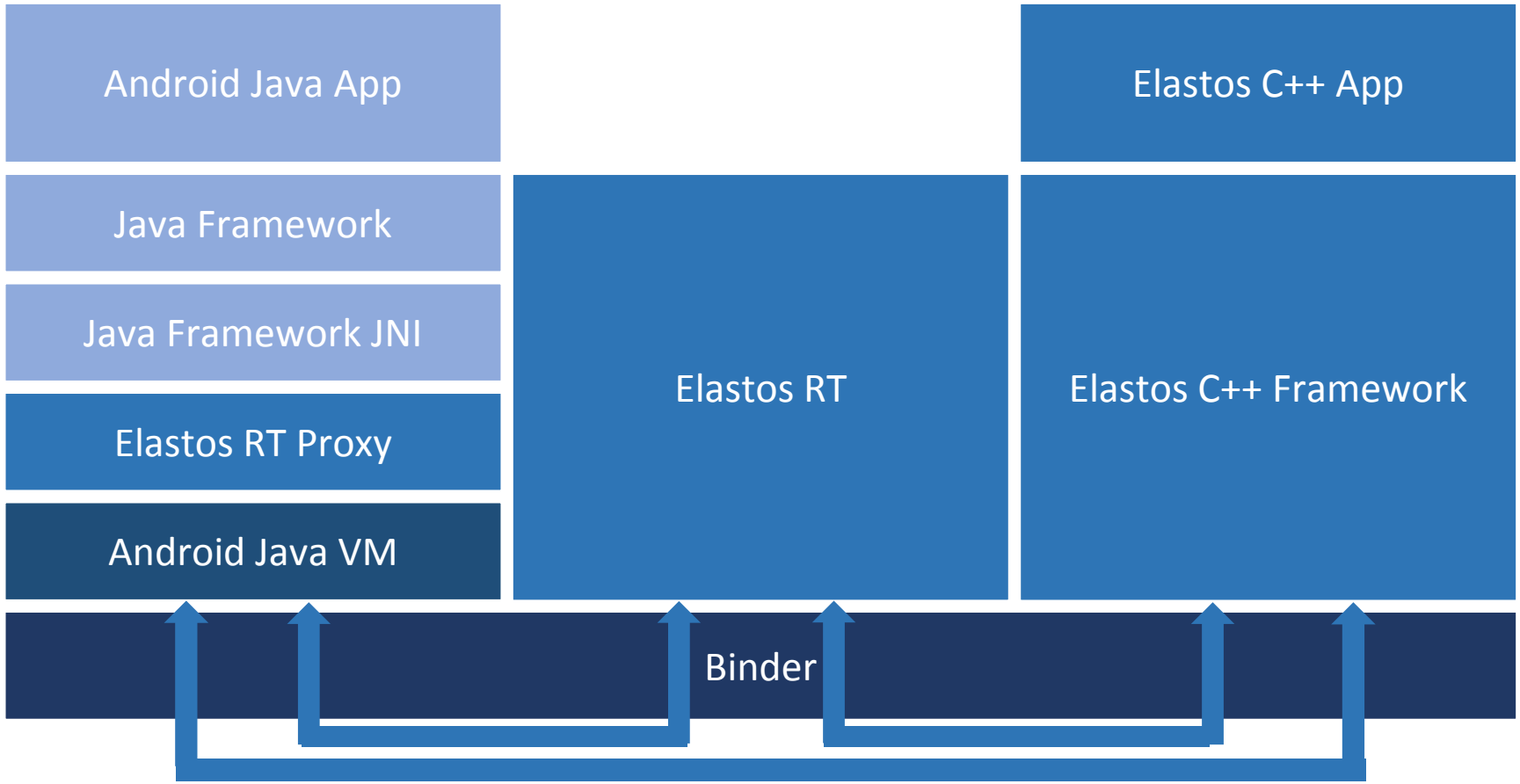
```
...

ECode CDemo::AddEventHandler(
   /* [in] */ IEventListener* listener)
{
   mListener = listener;
   return NOERROR;
}

ECode CDemo::DoTask()
{
   mListener->OnEvent(9);
   return NOERROR;
}

...
```

CDemo.cpp

Elastos Block Diagram



Elastos & Android Apps Run Side-by-Side



Elastos Value Propositions

1 Secure

- Elastos Runtime provides end-to-end solutions.

2 Trusted

- Blockchain makes faking identities impossible.

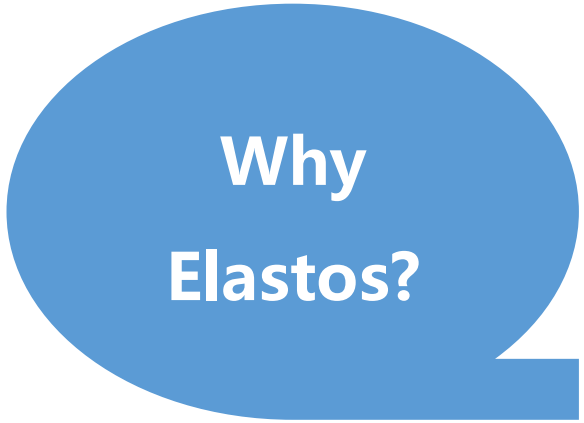
3 Open

- Peer-to-Peer Platform is open source.

4 Rewards

- Eco System needs its own electric currency.

Summary



Elastos Runtime is a C++ version of Java VM and Framework combined together. Similar to JVM stands for Java VM, we also refer to Elastos Runtime as CVM.

IoT solutions should meet the following requirements:

- Brand Agnostic
- Protocol Agnostic
- Carrier Agnostic
- Privacy Protection
- Mitigate Network Threats

Brand Agnostic	Apps & services of Elastos execute inside CppVM, to facilitate different branded hardware hosting the same service. (Write once, run any where.)
Protocol Agnostic	Elastos Runtime automatically finds or connects Apps and Services located in different CppVMs across the Internet.
Carrier Agnostic	Elastos platform resides on a P2P-network with its own decentralized DNS and distributed storage services.
Privacy Protection	IoT devices are treated as Elastos services, which could be found via Elastos Runtime. They are prohibited to directly access the Internet.
Mitigate Net Threats	All internet traffic of apps and services of Elastos are carried out by the Elastos platform. All CppVMs are registered on an Elastos blockchain.

References

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