



Decentralized Apps — & — Elastos Runtime

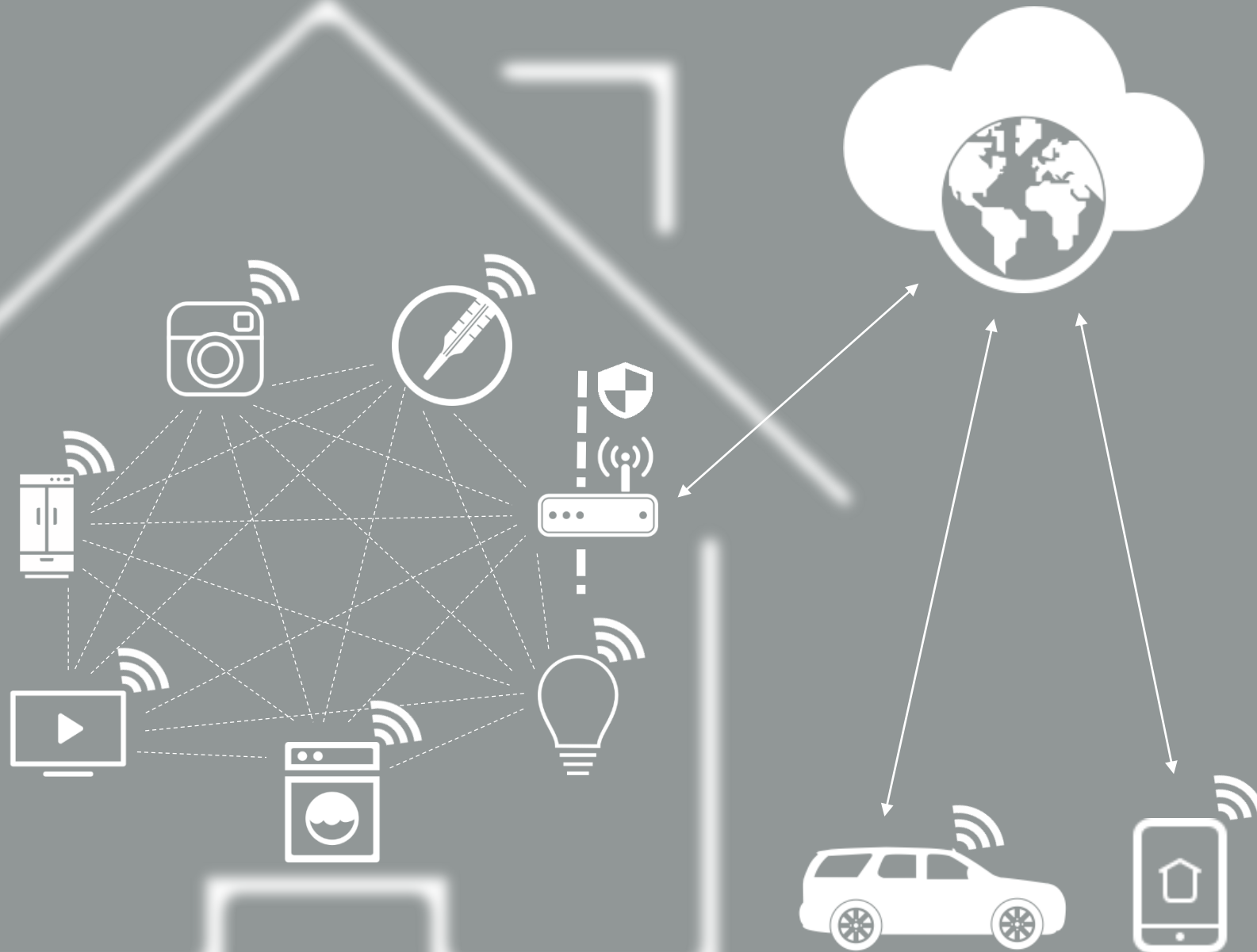
Rong.Chen@elastos.org

March 9, 2016

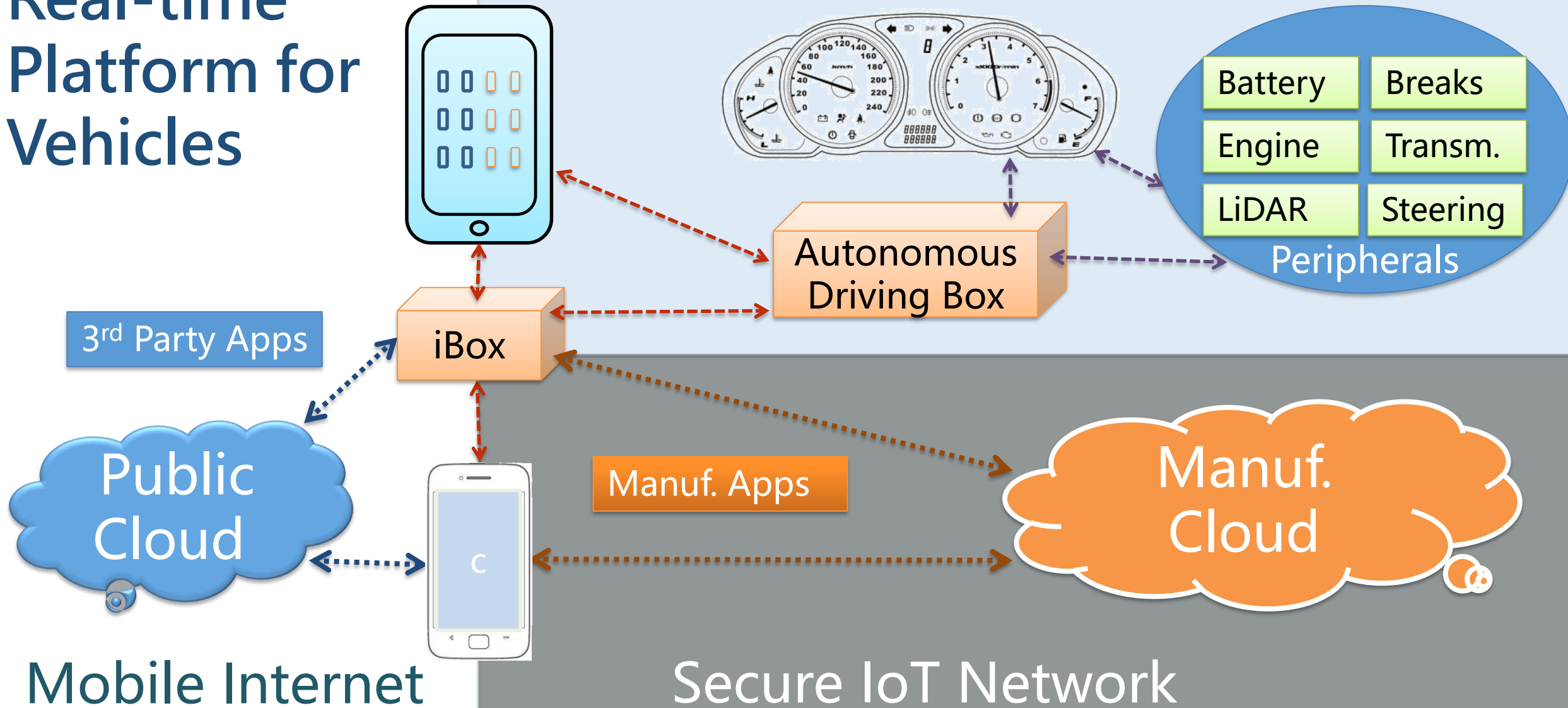
+86 186-0177-0188, chen2rong2@msn.com, wechat:chen2rong2

IoT Challenges

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

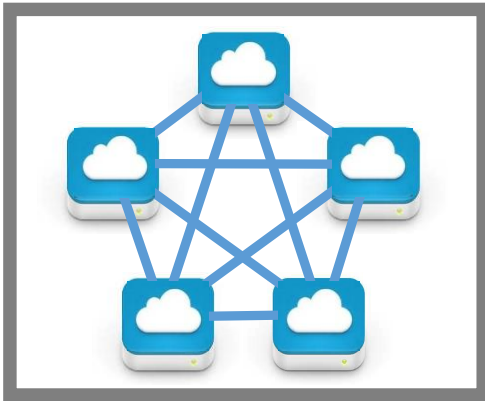


Distributed Real-time Platform for Vehicles



Definitions of Elastos & Blockchain Computers

Decentralized Personal Clouds

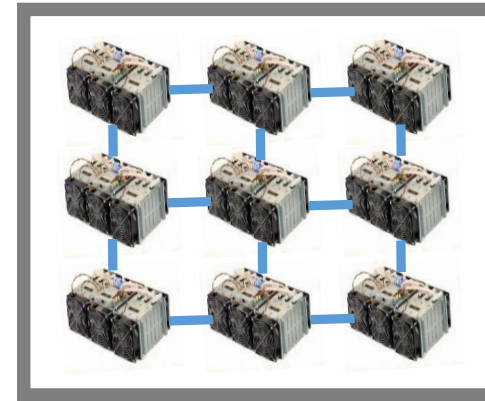


- ❑ A Van Neumann machine, with cloud mass storage and local HD as cache, is an Elastos computer;
- ❑ An Elastos carrier consists of a peer-to-peer network of Elastos computers ;
- ❑ Apps execute inside VMs on an Elastos computer of an Elastos carrier.

Distributed Computing

(the computation power is more than a single node)

"Decentralized" Blockchains

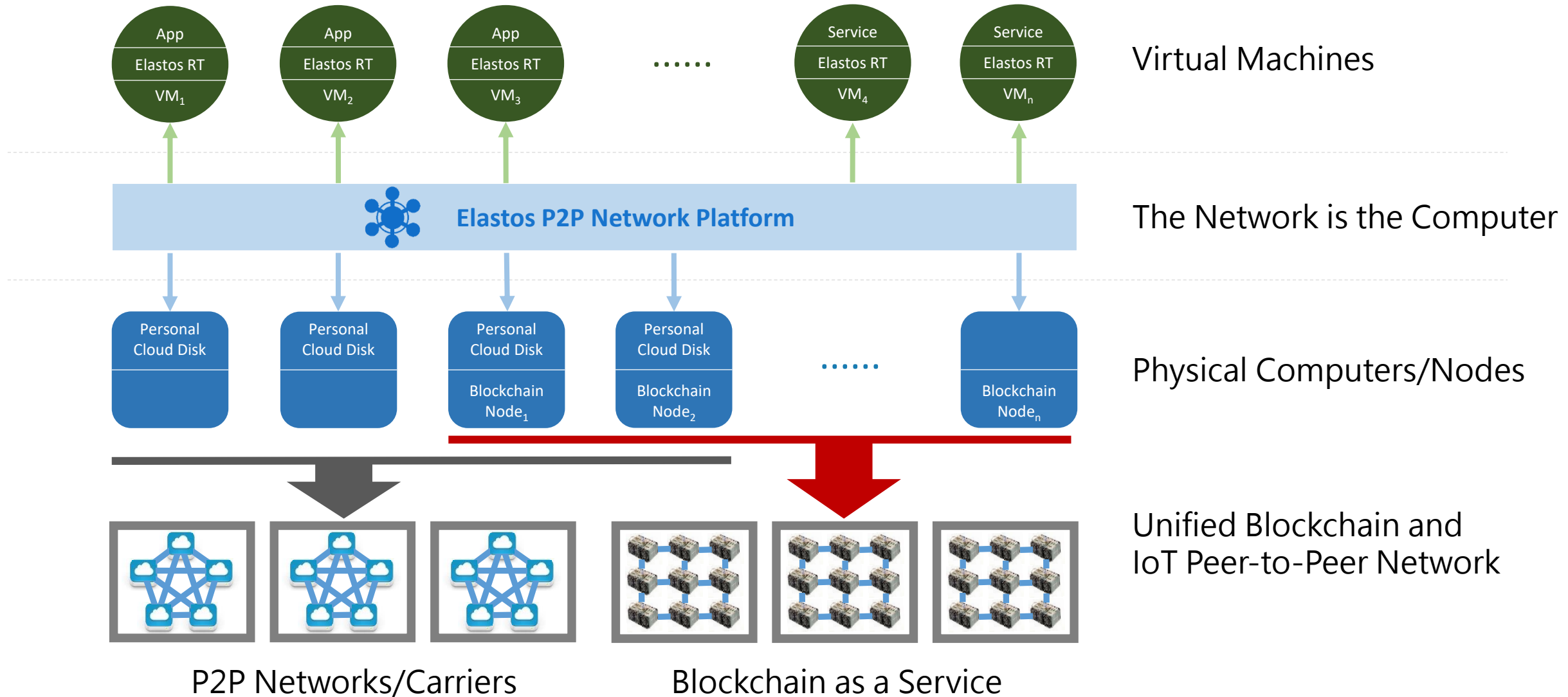


- ❑ A blockchain is really a blockchain computer;
- ❑ The peer-to-peer network of a blockchain computer is merely an internal bus;
- ❑ Apps of a blockchain computer are called smart-contracts or "DApps".

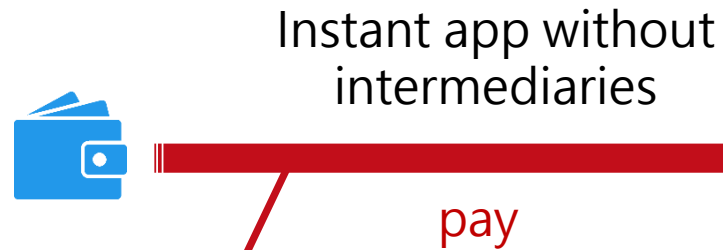
Duplicated Computing

(the computation power is less than a single node)

Building a Decentralized Internet Platform

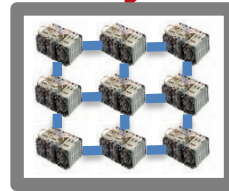
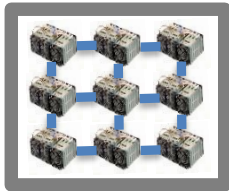
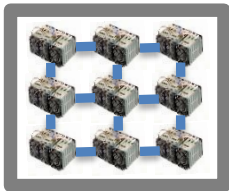


A Decentralized (Server-less) App Scenario



Elastos Network

Connect the virtual & physical world

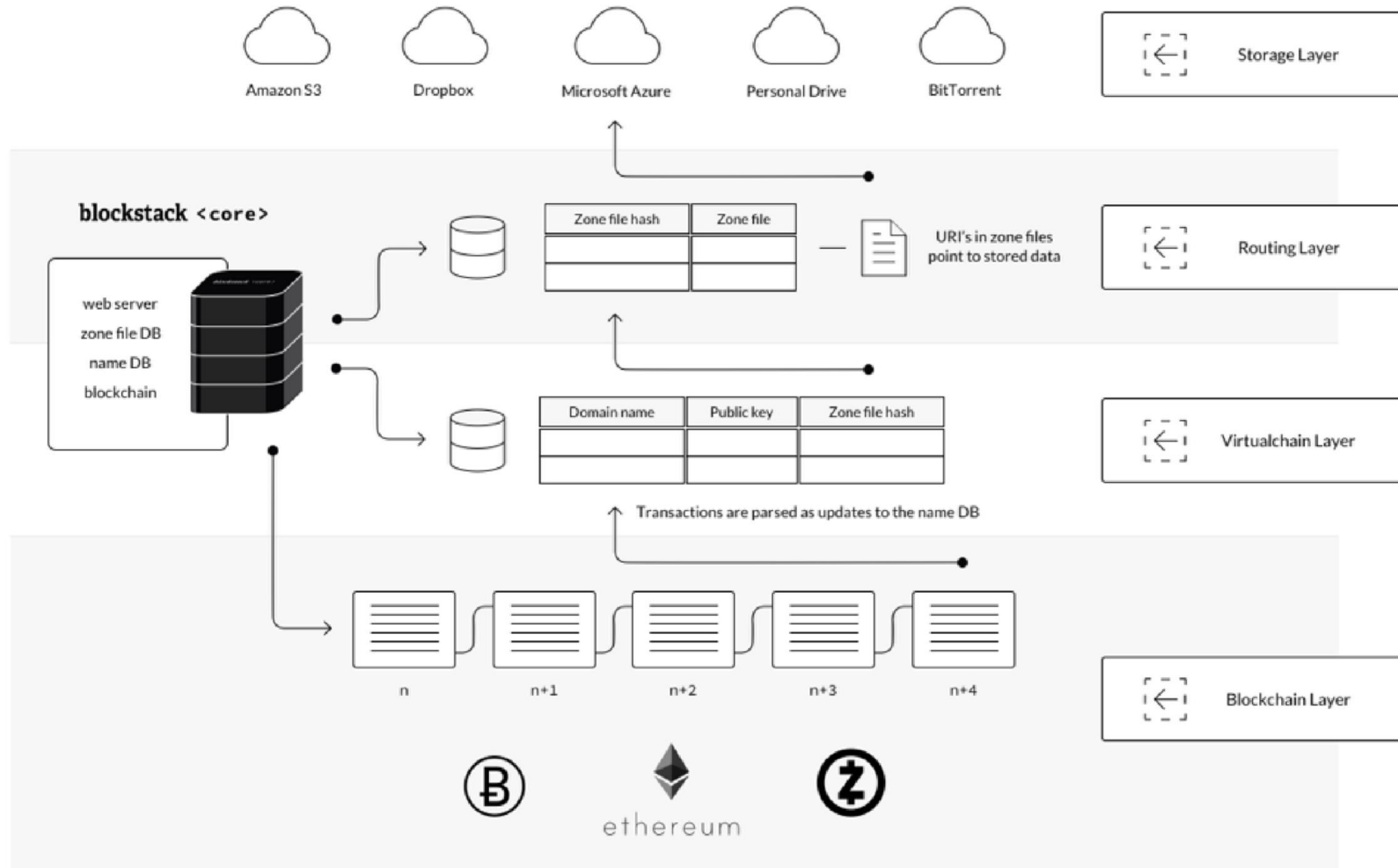


Blockchain Computers



Mobile & IoT Devices Run on Elastos Carriers

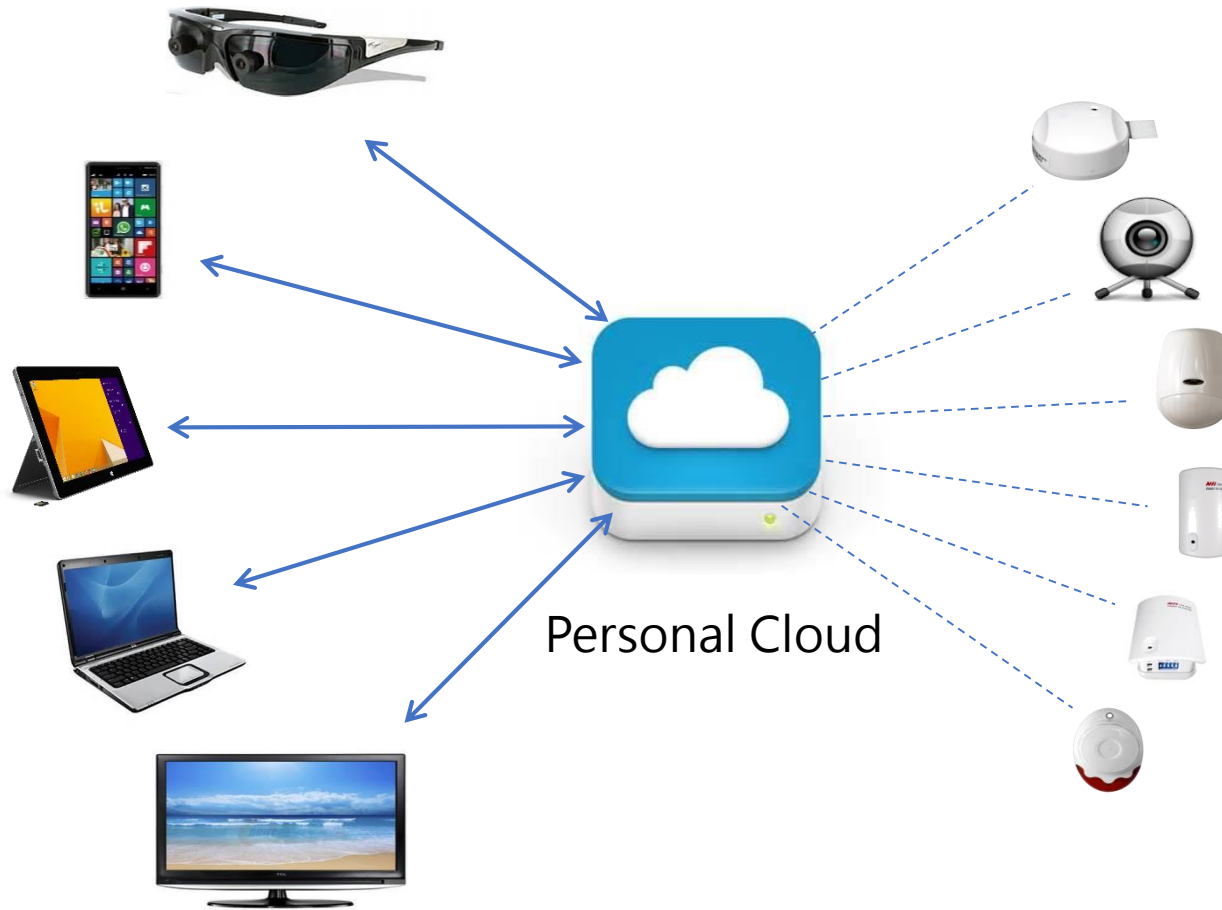
You Own Your Own Data (Blockstack)



Decentralized Apps Planned on Blockstack:

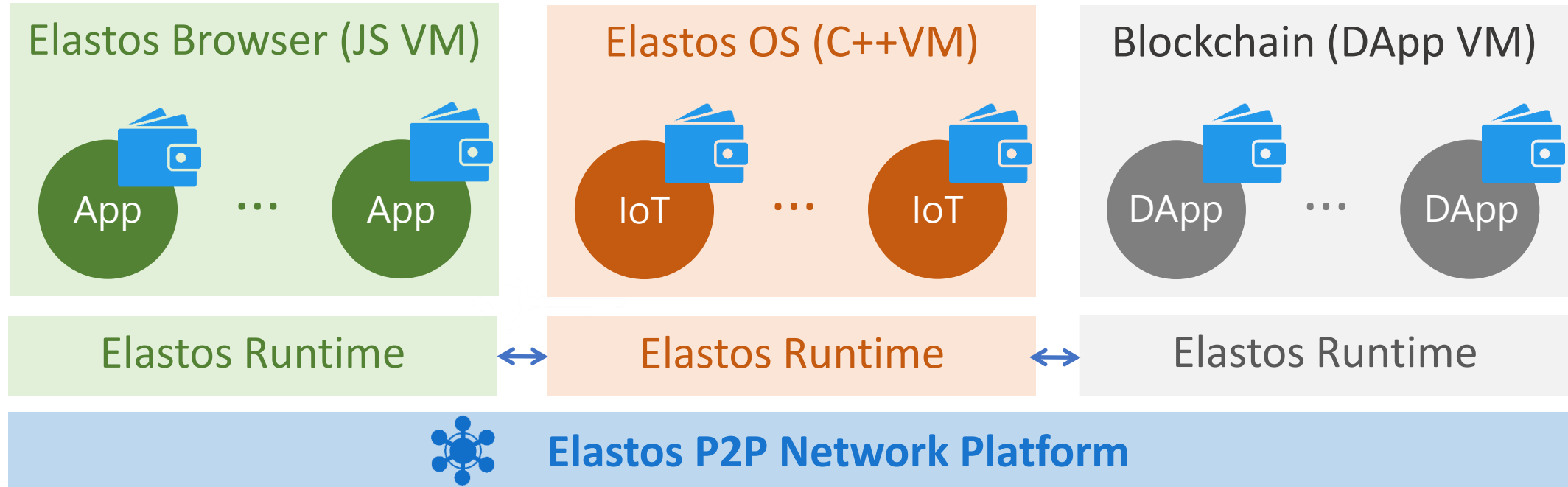
- ❑ Voting
- ❑ Marketplaces
- ❑ Identity verification
- ❑ Crowdfunding
- ❑ Messaging
- ❑ File sharing
- ❑ Document signing
- ❑ Video sharing
- ❑ Decentralized Reddit
- ❑ Decentralized Twitter

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.

Creating Scarcity of Digital Contents

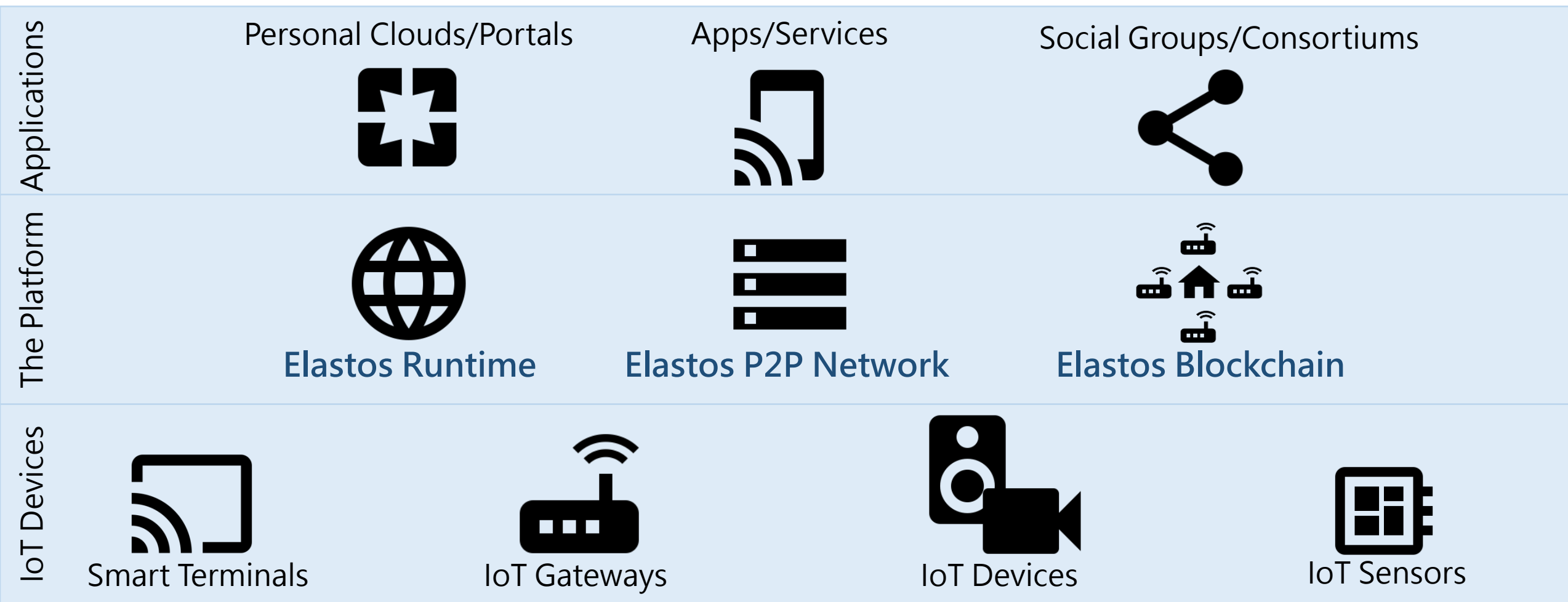


- ❑ Blockchain solved the property right authentication problem;
- ❑ An unified runtime VM is the key for digital content execution.

End-to-End Solution for a Safer Cyberspace



Three Open Source Projects of Elastos



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.

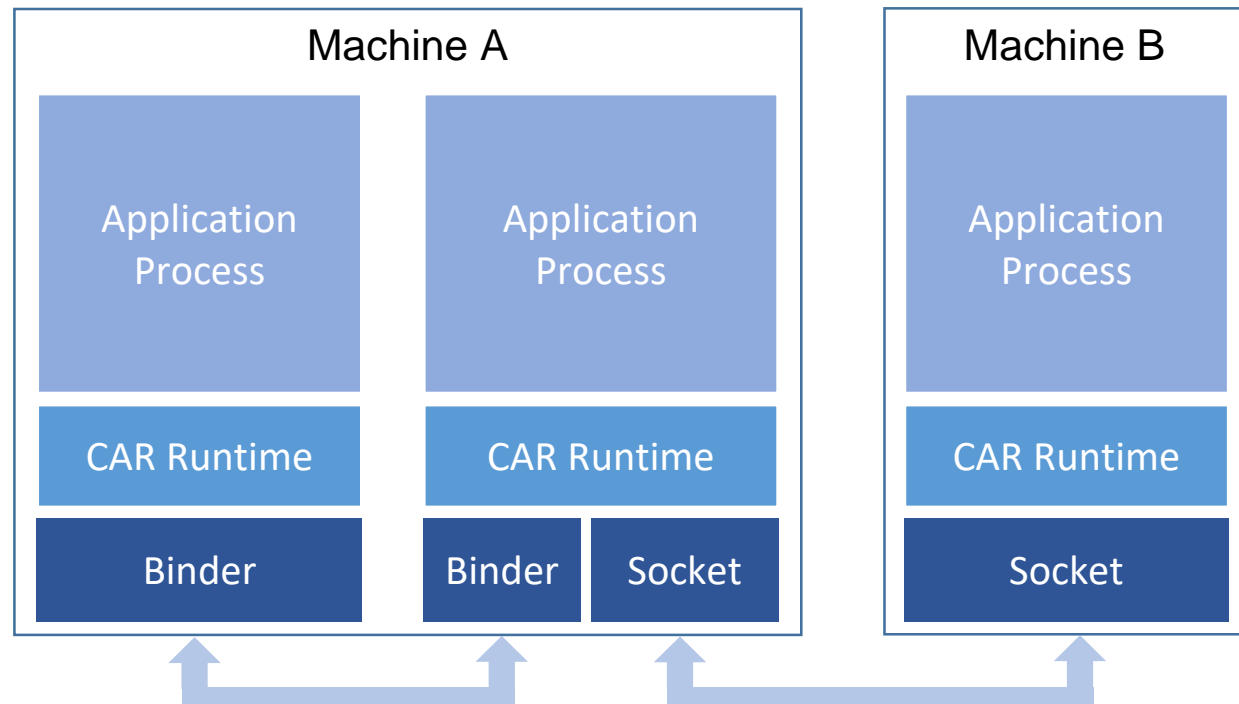
Windows UWP vs. Elastos Runtime

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.addHandler(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

```
...

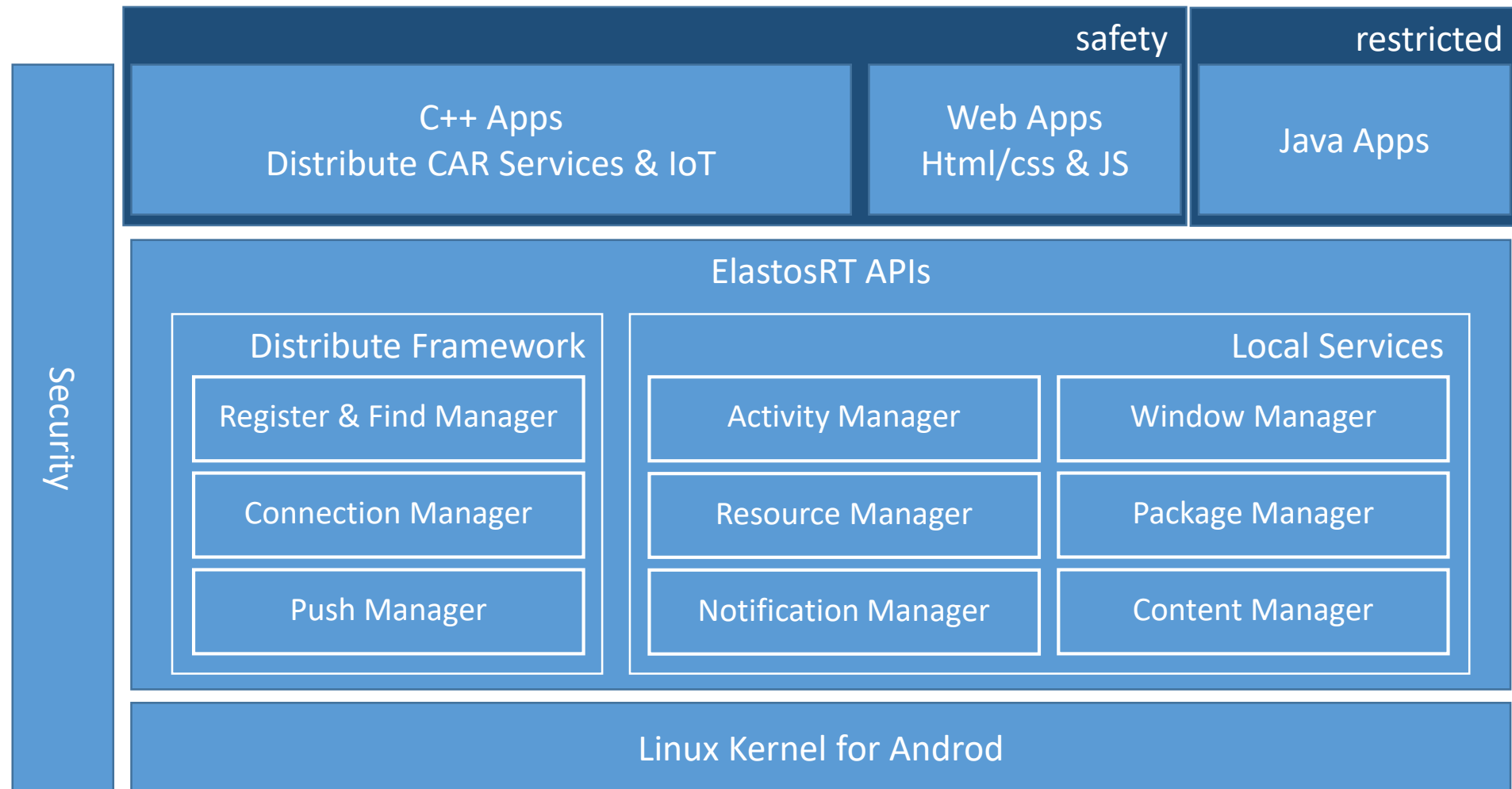
ECode CDemo::AddEventHandler(
  /* [in] */ IEventListener* listener)
{
  mListener = listener;
  return NOERROR;
}

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

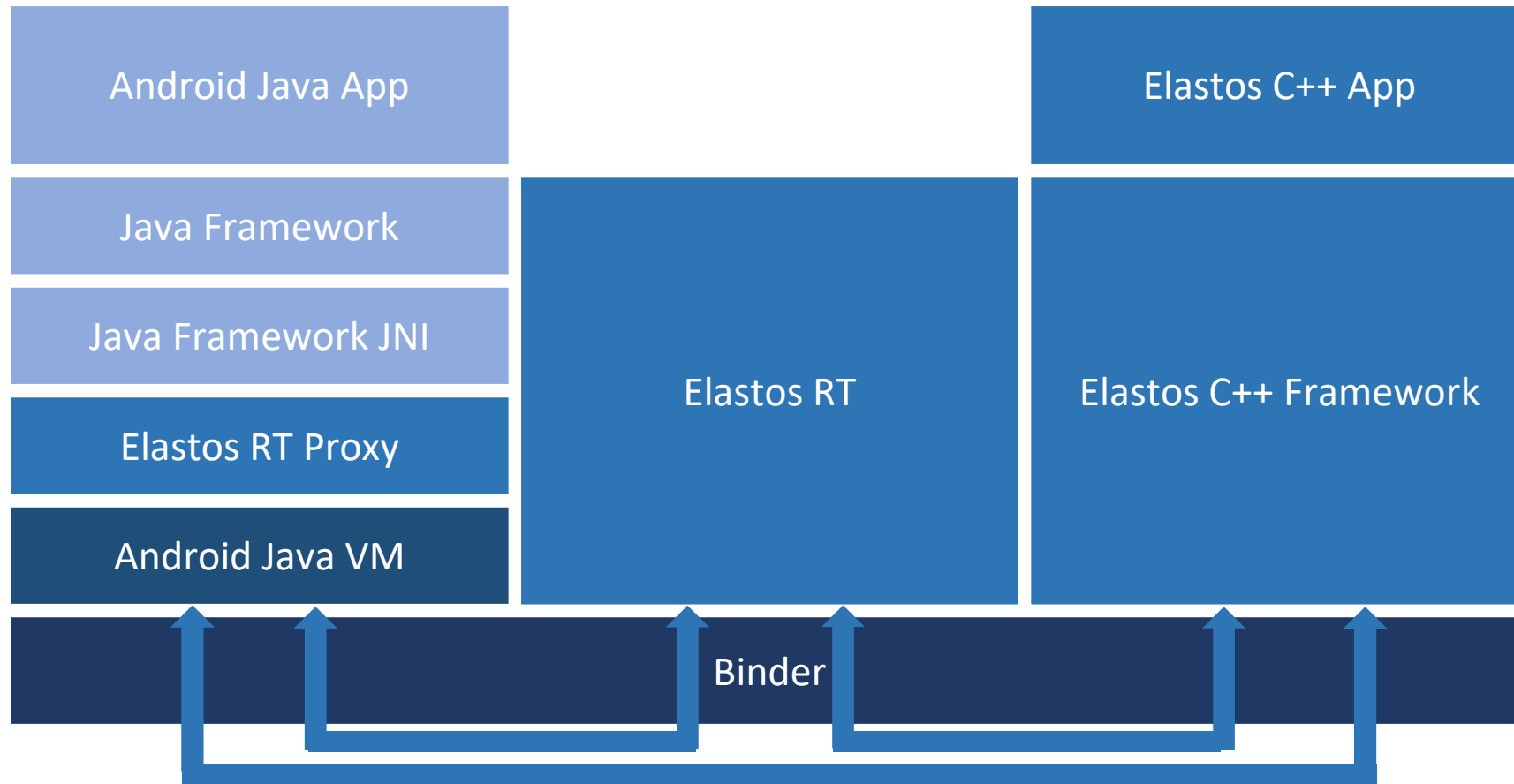
...
```

CDemo.cpp

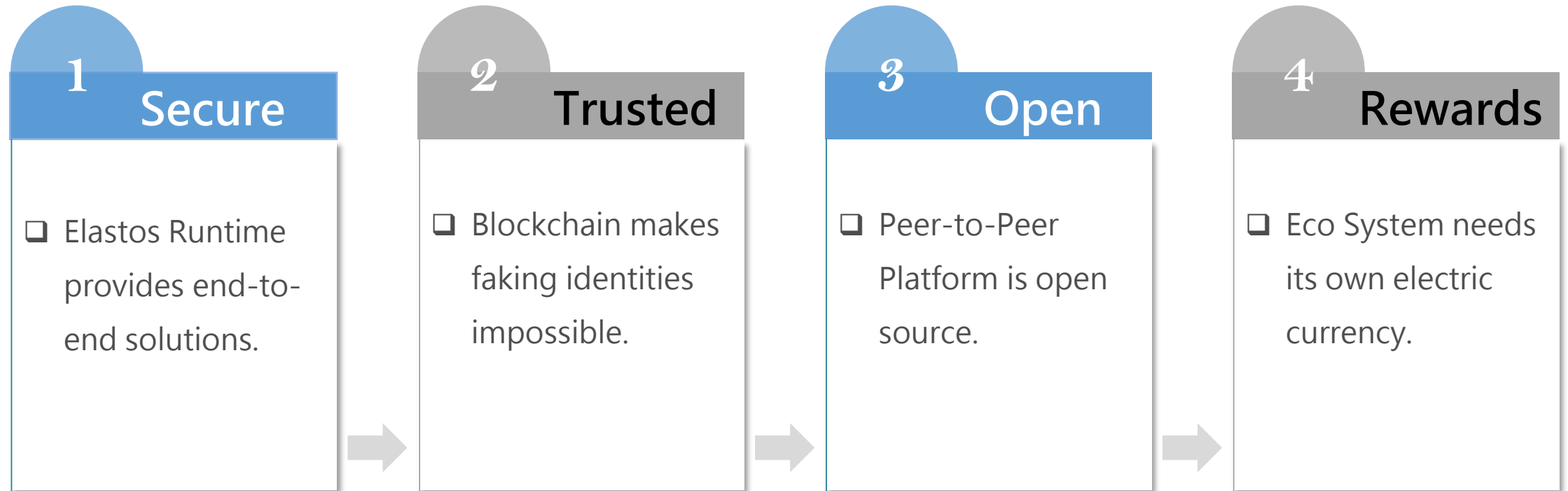
Elastos Block Diagram



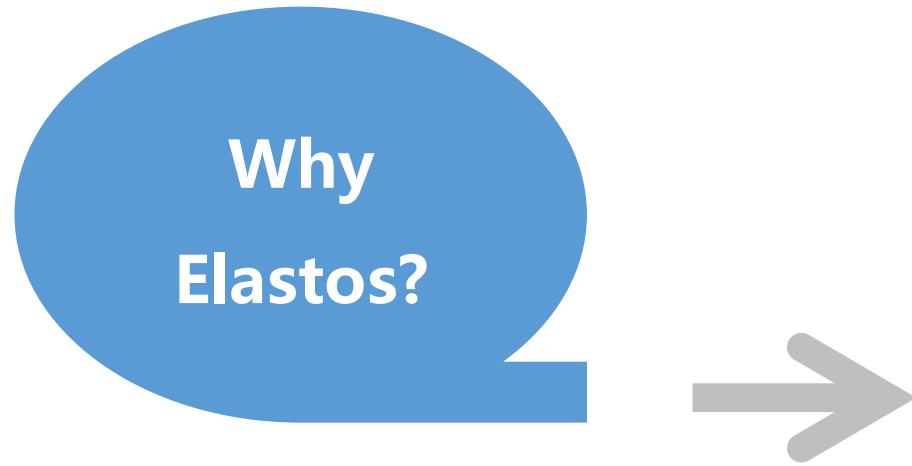
Elastos & Android Apps Run Side-by-Side



Elastos Value Propositions



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

1. *The internet is broken. Starting from scratch, here's how I'd fix it*
 - <https://www.linkedin.com/pulse/internet-broken-starting-from-scratch-heres-how-id-fix-isaacson>
2. *The future is a decentralized internet*
 - <https://techcrunch.com/contributor/olaf-carlson-wee/>
3. *Funding the New Decentralized Internet*
 - <https://blockstack.org/blog/funding-the-new-decentralized-internet>
4. *Elastos Executive Summary*
 - <https://www.linkedin.com/pulse/elastos-executive-summary-rong-chen>
5. *Elastos Source Code on GitHub.com and Elastos.org*
 - <https://www.github.com/elastos/> and <http://elastos.org/>