



Mihini

An open-source framework for M2M development

Benjamin Cabé
bcabe@sierrawireless.com — @kartben

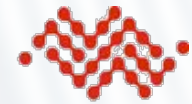
Who I am



- Benjamin Cabé
- Open Source guy at Sierra Wireless
- Long-time Eclipse lover



Sierra Wireless



SIERRA
WIRELESS™



A leading provider of Mobile Computing
and Machine-to-Machine cellular
wireless solutions



Founded in 1993
Experienced leadership
Approximately 900
employees worldwide



Broad range of high performance hardware
& software solutions



Proven innovator in new wireless
technologies, embedded systems
and end to end solutions



Annual Revenue
\$650 million



Strong global presence.
HQ in Vancouver, Canada
R&D on three continents



NASDAQ
TSX

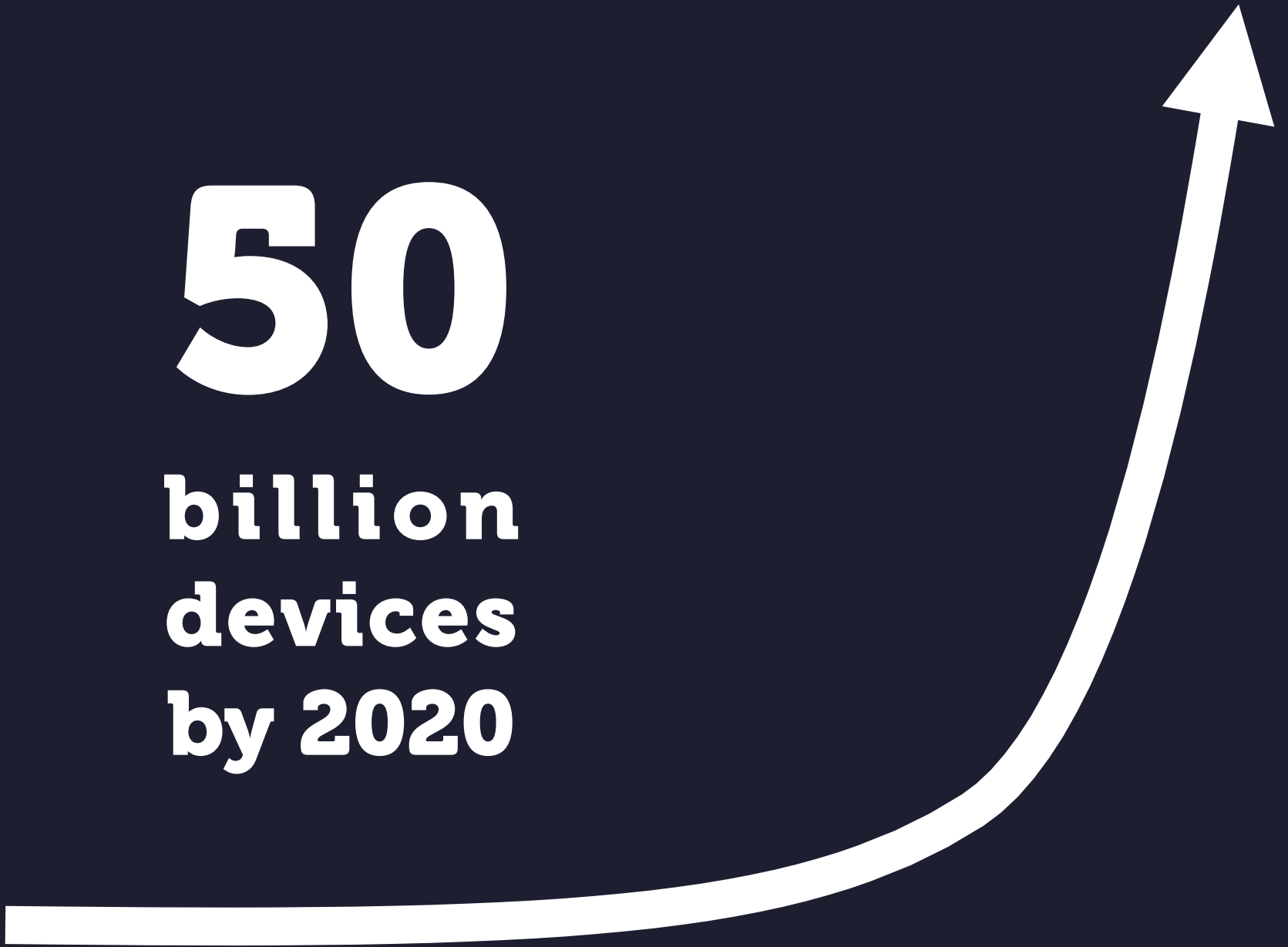
What is M2M?



Technology that supports
wired or wireless
communication
between devices

50

**billion
devices
by 2020**



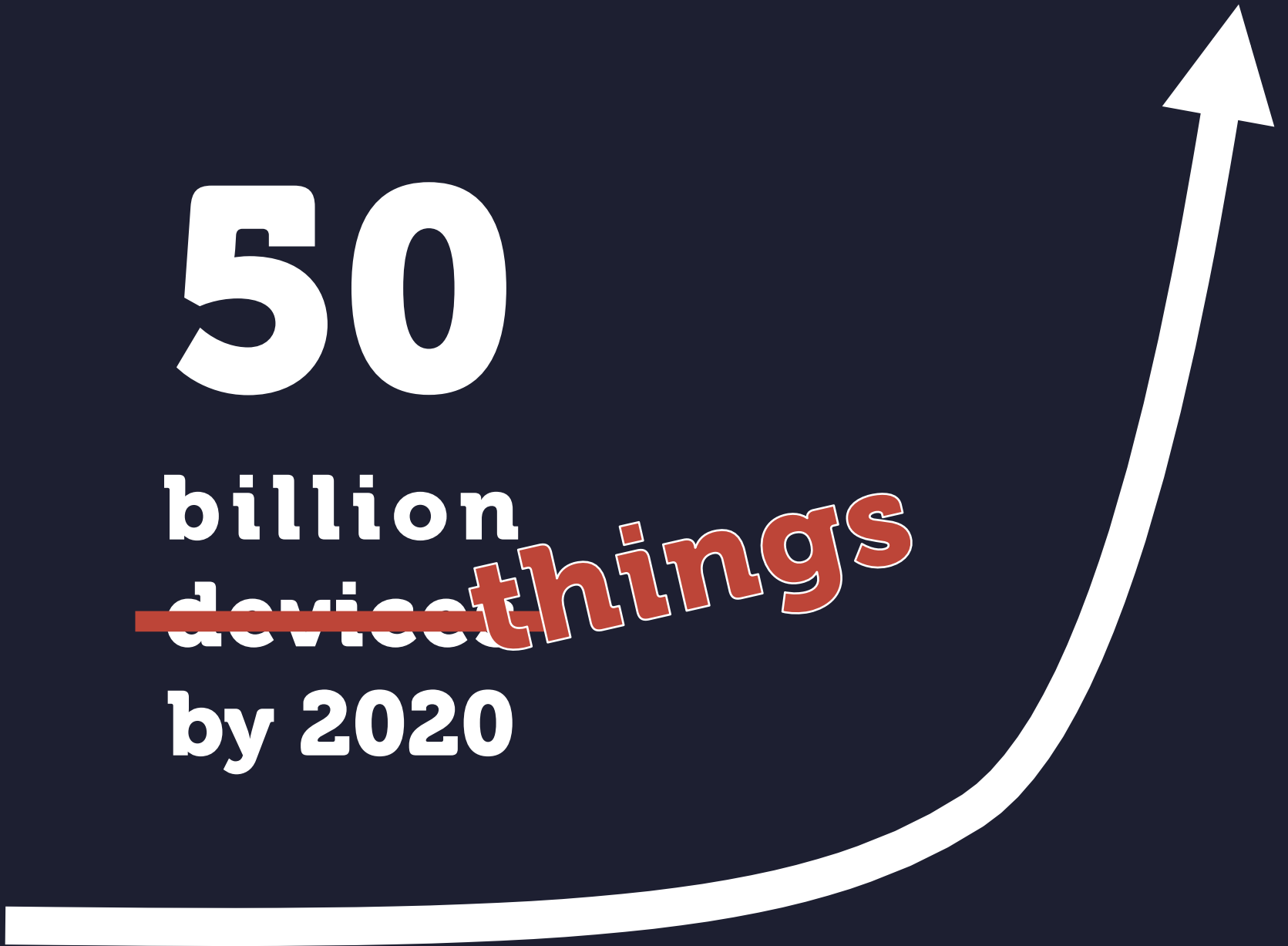
50

billion

~~devices~~

by 2020

things



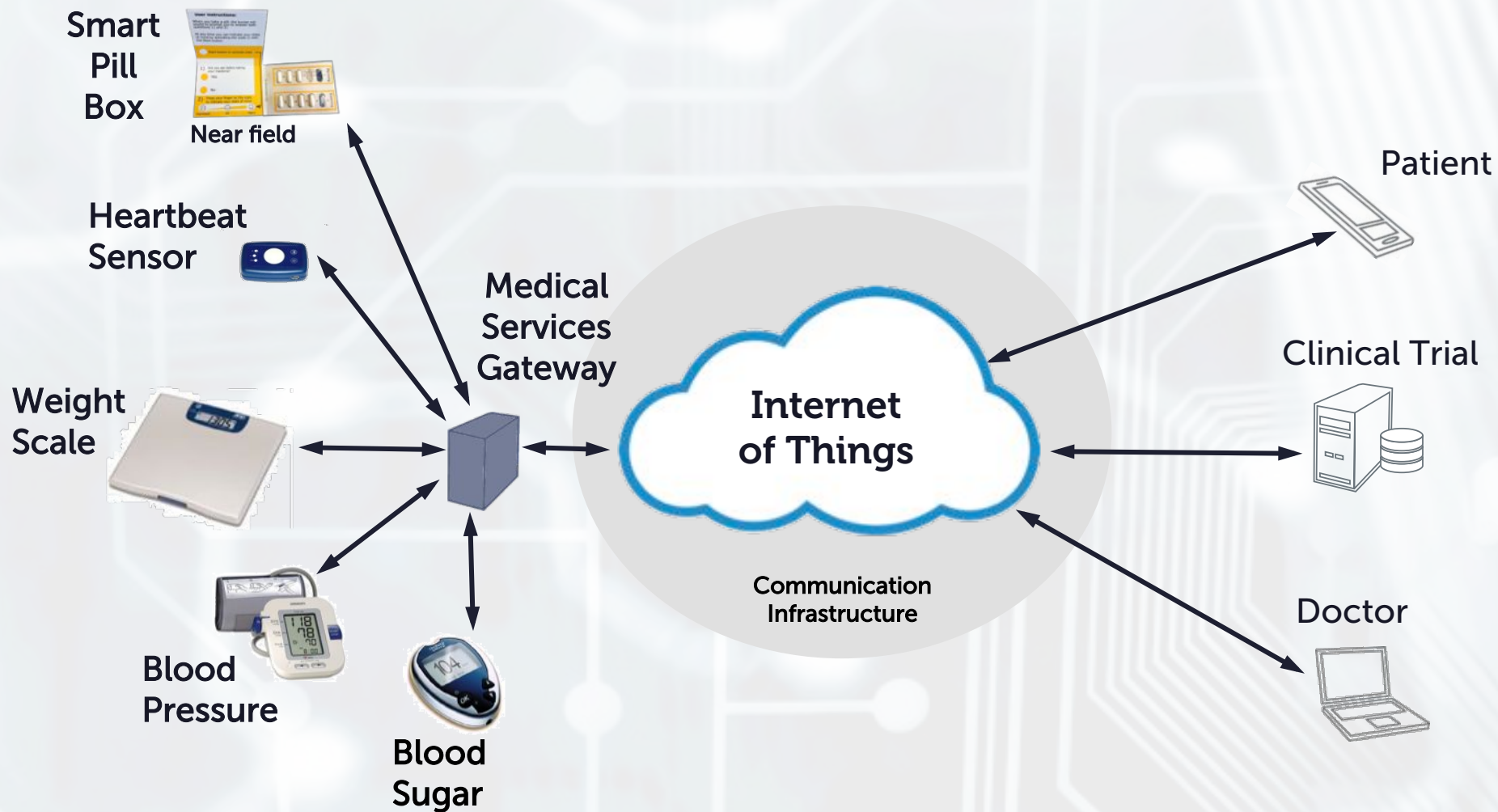












An aerial photograph of a vast, green, grassy field. A line of wooden fence posts runs diagonally across the lower-left portion of the image. The terrain is uneven with varying shades of green and brown, suggesting different types of vegetation or soil. In the upper right, there are some small, dark, irregular shapes that could be trees or shrubs. The text "Ready then?" is superimposed in the center of the image in a large, bold, black font.

Ready then?

A photograph of a grassy hillside with a fence line. The text "...Not quite!" is overlaid in the center. The hillside is covered in green grass with some brown patches. A fence line runs diagonally across the frame, with a wooden post visible on the left. In the background, there are some trees and a small building.

...Not quite!



**M2M market
= fragmented**



**M2M development
= complex**



**M2M vendors
= lock-in**



open source ?



m2m

eclipse.org

Axeda

BANDXI
INTERNATIONAL

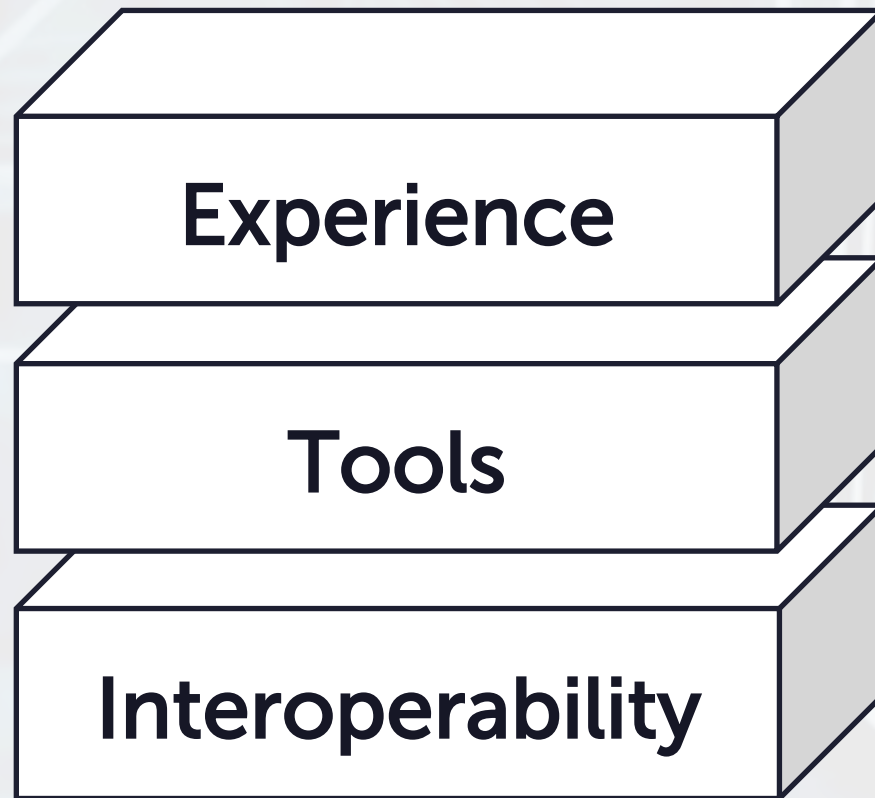
 **Cirrus Link**
SOLUTIONS

 **EUROTECH**
Imagine. Build. Succeed.

IBM


SIERRA
WIRELESS

3 pillars



3 projects

Framework

mihini

Protocols

paho

Tools

koneki

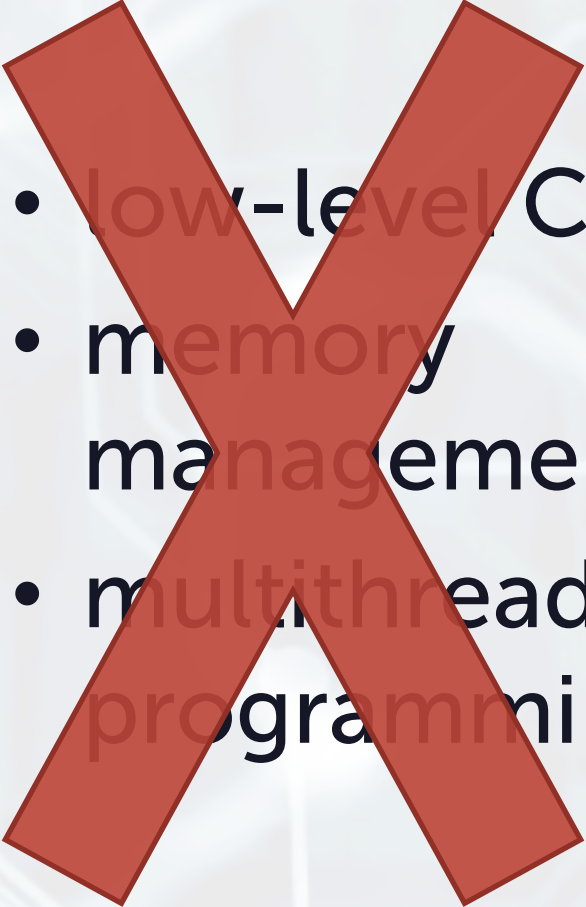
mihini = framework

I/O manipulation
data consolidation
application management
dev-friendly API

Before Mihini

- Proprietary “OS”
 - No consistent HW access layer across Sierra product line
 - No POSIX API
- Applications written in C
 - Learning curve
 - Compilation and debug are complex

M2M programming

- 
- low-level C
 - memory management
 - multithreaded programming

- read sensor values
- control actuators
- consolidate data
- communicate

Example: Sending an SMS

```
int main()
{
    unsigned char char1[10];
    unsigned char char_buf[8]="AT+CSQ\n";
    // unsigned char sms_buf[20] = "AT+CMGS="xxxxxxxxxx";

    int wc_fd;
    /****** Init of serial port *****/
    wc_fd = init_wc(wc_fd);
    sleep(3);
    //writing to serial port
    write(wc_fd,char_buf,sizeof(char_buf));
    usleep(40000);
    //reading from serial port
    read(wc_fd,char1,sizeof(char1));

    sleep(2);
    close(wc_fd);

    return 0;
} // end of main

// initialization of serial port

struct termios options;

ttys5_fd = open("/dev/ttyS5", O_RDWR );
if (ttys5_fd < 0)
{
    printf("\nFail to open serial port 2\n");
    return 0;
}
```

```
sms.send(
    '+33612345678',
    'My SMS',
)
```

Simplify M2M programming



- powerful
- fast
- lightweight
- embeddable
- scripting
- C integration

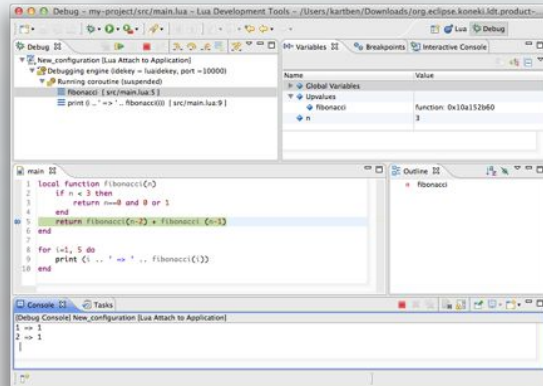
Lua is also...

- A vibrant community
- A rich ecosystem of libraries
- A closed development model

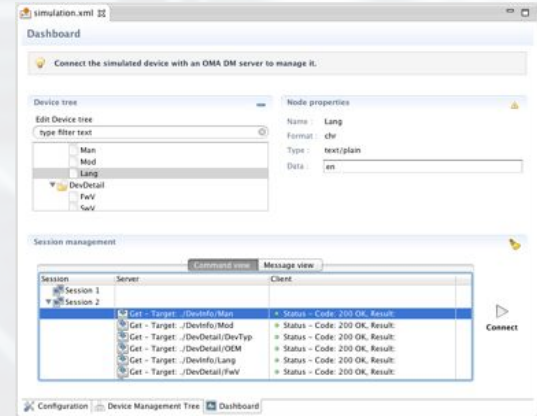
koneki = tools

develop
simulate
debug
deploy

koneki



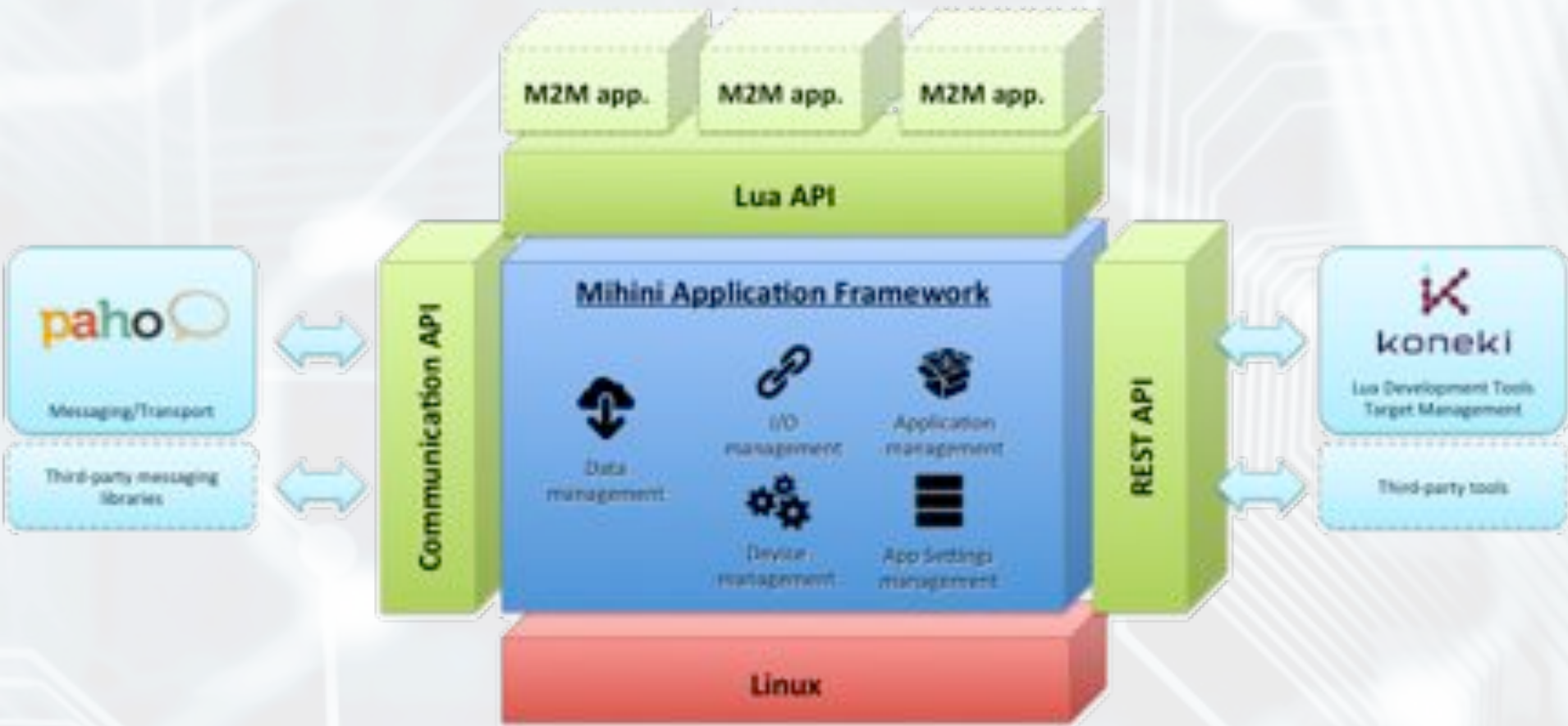
Lua Development
Tools



OMA-DM
Simulator

Next: Mihini tooling, M2M modeling

Mihini architecture overview



Moving to Eclipse Fdn?

- **Community**
 - users
 - contributors/committers
 - adopters
- **Governance**
- **IP framework**
- **IT resources**

Building a community

- Going open source is also a way to
 - simplify developer experience
 - grow a community
 - enable innovation (see open H/W hobbyists)

M2M Developer Kit



Affordable

DIY
Arduino

Simple

CAN bus
Modbus

Industrial

M2M Developer Portal

m2m.eclipse.org

m2m.eclipse.org is where you can learn about the technologies developed at [Eclipse](#) to make Machine-to-Machine (M2M) development simpler.

These technologies aim at establishing an open, end-to-end, M2M stack.

< **mihini** >

[Mihini](#)

Mihini will deliver an embedded runtime running on top of Linux, exposing high-level Lua API for building M2M applications.

Frameworks



Deliver an embedded extensible runtime enabling M2M vertical applications.

In order to enable the creation of M2M apps on communicating embedded devices, we provide a complete framework enabling device management, software updates, ...

[More »](#)

Protocols



Provide Open Source implementations of standard M2M protocols.

Currently, we provide tools and libraries for:

- [MQTT](#) messaging protocol
- [OMA-DM](#) Device Management protocol

[More »](#)

Tools



Package a "one-stop shop" IDE for M2M developers.

We believe that Lua is a language very well-tailored for M2M, therefore the first component we deliver is an IDE for Lua development, called [Lua Development Tools](#).

[More »](#)

New business models

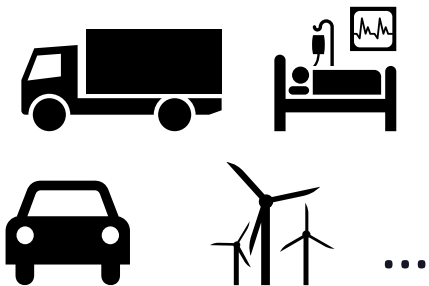
Third Party Ecosystem

Open M2M
communication protocols

Open M2M application
framework and runtimes

Open M2M
development tools

Internet of
Things



H/W differentiation



- ruggedness
- radio certification
- add-ins
- services

S/W differentiation

embedded	server
industrial protocols power optimization development tools vertical applications real-time professional services ...	24/7 3 rd party services security billing carrier integration professional services ...

Wrap-up

- **A complete M2M stack**
 - embedded framework
 - comm. protocols (client and server)
 - tools
- **An open collaboration model**
- **A de-facto standard M2M platform for enabling new businesses**

Join us!



m2m

eclipse.org