EXTREME CONNECTIVITY....
tools & applications
for networked devices
& environments

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WHY NETWORK DEVICES & ENVIRONMENTS?

- remote monitoring & control
- connected interactions, new social relationships
- products → services (recurring revenue)
- new business-models
- real-time product analytics
- unique in the market
- network, many-to-many & cross-domain benefits/efficiencies
- both ‘making data public’ & ‘public making data’
- third-party extensibility
PACHUBE IS...
A ‘PATCH-BAY’ FOR DEVICES & ENVIRONMENTS

- Microcontrollers & sensors
- Building management systems
- Mobile objects & vehicles
- Wearable & biosensors
- Environmental/pollution
- Virtual environments
- Automation systems
HORIZONTALITY ENABLES INNOVATION

ENERGY
HOME AUTOMATION
MOBILE SYSTEMS
SECURITY SYSTEMS
HOME HEALTH CARE

SENSORS AND MICROCONTROLLERS
INDUSTRIAL PROCESS MONITORING
BUILDING AUTOMATION
TRANSPORTATION TRACKING
WEATHER STATIONS

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PACHUBE’S API MAKES IT POSSIBLE

- Enables both storing & sharing state & context data
- Supports multiple protocols & adapters
- Manages & stores all data – not just summaries
- Provides for rich, user-extensible meta-data
- Delivers scalable, resilient, always-on services
KEY MARKETS

**Energy:** smart meters talk to utilities to load-balance & reduce total capital investment; utilities communicate with customers

**Buildings & Home Automation:** sharing environmental & occupancy data to lower energy costs & increase efficiency

**Industrial Process Monitoring:** remote status, tracking & trending, exception alerts

**Sensor Networks:** analysis & monitoring; warning of dangers to infrastructure, minimizing damage to property & harm to people

**Transportation:** sharing location & status to optimize routing, maintain efficiency, minimize repairs

**Home Healthcare:** communicate with hospitals to improve outcomes & lower the overall cost of care
THERE ARE MANY CHALLENGES...

• **Scalability** of m2m data that is increasing exponentially

• **Interoperability** across all devices & networks

• **Management** via web-based tools to control & visualize

• **Performance** demands of high-throughput, low-latency

• **Openness** for ease of adoption & industry acceptance

• **Security** controls that are flexible & robust
...HERE’S HOW WE MEET THEM

• **Scalability** of m2m data that is increasing exponentially
  • innovative architecture, proven reliability & uptime, cloud-based infrastructure
  • on-demand scalability
• **Interoperability** across all devices & networks
  • adapters & libraries for every major programming language
  • device & technology-agnostic
• **Management** via web-based tools to control & visualize
  • ‘out-of-the-box’ control apps & visualization widgets
  • tool-kit for creating, customizing & maintaining 3rd party services
• **Performance** demands of high-throughput, low-latency
  • engineered & optimized for high data-loads & low latency
  • redundancy architecture for high-availability
• **Openness** for ease of adoption & industry acceptance
  • standards-based APIs
  • simple & quick sign-up for prototyping & development
• **Security** controls that are flexible & robust
  • industry-standard HTTPS, SSL
  • powerful permissions & authentication management
To **instrument** the planet
To make life **easier today**
To build a **sustainable future**
4. PRODUCT OVERVIEW

CORE APPLICATION

www.pachube.com
website & RESTful API, range of account types
CORE APPLICATION

- **Web site & API**
  - Ruby on Rails
  - PostgreSQL DBMS
  - Hosted with Rackspace Cloud (dedicated DB server)

- **Functionality**
  - **Users > Environments > Datastreams > Datapoints**
    - users, environments & datastreams may or may not be individual devices
  - RESTful interface, XML, JSON, CSV
    - feeds (i.e. individual environments with a geolocation and other metadata)
    - datastreams (i.e. individual datastreams with tags, units and other metadata within a feed)
    - datapoints in a variety of formats (int, float, string, etc.) with a timestamp
  - triggers / notifications
  - history
  - PNG graph of individual datastream activity over last 1 hr, 24 hrs, 4 days or 3 months
  - search functionality for feeds and datastreams by query, tag, user, units or status, geolocation
  - User API

- **Device Provisioning Server**
  - register devices / feeds / users in-factory
  - manage device deployment
PACHUBE’S WEB DASHBOARD

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APPLICATION ECOSYSTEM

Visualization tools
- **PNG realtime graph gadgets**
  - 1-hr, 24-hrs, 4-days, 3-months
- **Zoomable Javascript graph**
  - 30-days
- **Embeddable Flash widget**
  - PachuBlog
  - Google Gadget Feed Badge
  - PachuDial

Feed input tools
- **Web service / mashup**
  - Pachube Pipes
  - XML 2 CSV
  - PachTweet
  - Status2Pachube
- **Converters**
  - Pachube KML Convert
  - Pachube Google Doc Spreadsheet Importer

Feed output tools
- **Alerts**
  - SMS alert
  - Twitter trigger, email alert
- **Converters**
  - AMEE Carbon Footprint
- **Plug-ins**
  - Pachube2Sketchup
  - Pachube2SecondLife

Control tools
- **Dashboards**
  - PachuSwitch
  - Pachube Controller (Appspot)
- **HTML Control Form**
  - standard HTML form

Mapping tools
- **2-d tracking**
  - Trails
- **3-d flythrough**
  - Earth Browser

Feed discovery
- **Text**
  - Feed Finder
- **Geolocation**
  - PachuRadar

Mobile device applications
- **iPhone**
  - Data Logger
  - Pachube Mon
  - Porthole iPhone
- **Android**
  - Pachube Viewer
  - Fastque Pachube Widget
- **Blackberry**
  - PachuBerry
- **Java (e.g. Nokia N95)**
  - PachuRadar

SMS Gateway
- **Input & Output**
  - Control feeds
  - Receive alerts, query

Augmented Reality apps
- **AR Toolkit / QR Code**
  - Pachube AR
  - Porthole (Mac / iPhone)
API: PLATFORM INTEGRATION

• Software libraries & examples
  • Java, Ruby, .net, Perl, C, Python, PHP, Visual Basic, Javascript
  • LabVIEW, Processing, OpenFrameworks, Flash, Adobe AIR, Google Visualization API
  • Asterisk PBX, Cold Fusion, xAP, Domotica, Germanium Web 3D, FHEM Home automation

• Hardware applications & examples
  • iPhone, Blackberry, G1/Android Google Phone, Windows CE for smartphones
  • Arduino, Zigbee, SunSPOT, Phidgets, GainSpan, Mocana
  • weather stations, LiveBox, CurrentCost, Insteon/Indigo Home Automation

• Virtual systems
  • Second Life, OpenSim, server monitoring, webscraping

• Web service & application integration
  • Twitter, AMEE, SketchUp, Google Earth, Skype, MSN, AIM, Yahoo, xAP

• Physical installations
  • Buildings, energy meters, pollution monitors, ships, satellites, city utilities, mobile devices, automobiles
OUT-OF-THE-BOX APPS

• Embed visualization tools, maps & graphs in websites

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OUT-OF-THE-BOX APPS

- Dashboards & widgets for branded portals
OUT-OF-THE-BOX APPS

- Mapping tools: track mobile feeds & distributed sensor networks in real time
PORTHOLE

1. CO2
1. Location
1. Air pressure
1. Rain
1. Wind
1. Humidity
1. Others

color: sensor type
radius: 24hr variance
height: realtime value
graph: 24hr values

AR Marker Detected and QR Code Read Correctly
Updating Data From Pachube FeeID: 6893...
OUT-OF-THE-BOX APPS

• Augmented Reality: visualize environmental & sensor data from devices & buildings
OUT-OF-THE-BOX APPS

• Smart phones: monitor, control & update feeds using a variety of mobile phone apps
REALTIME DATA IN DESIGN

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CASE STUDY 1: CURRENT COST LTD

Current Cost
- out-of-the-box API
- device provisioning
- energy distribution tracking
- expandable, upgradable
- 3rd party app developers

Current Cost's customers
- secure login
- remote monitoring of energy use
- energy use comparison
- mobile phone app
- SMS alerts
- no subscription

energy monitor
CASE STUDY 1: CURRENT COST LTD

Pachube's API
• simplifies device programming
• cheaper hardware
• a broker, not an end-point
• manages millions of datapoints per day
• expandable, upgradable
• revenue sharing

Current Cost
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energy monitor

'Bridge' device
to the Web
CASE STUDY 2:
CASE STUDY 3: NATURAL FUSE
CASE STUDY 4: COFFEE MACHINE

Siemens – Logo control

coffee
algorithm
sum(desire/distance)