WIND

AN INTEL COMPANY

Utilizing the Blockchain to Manage Open Source Across the Supply Chain

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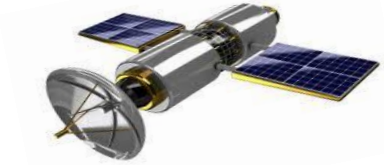
WHEN IT MATTERS,
IT RUNS ON WIND RIVER.

WIND™



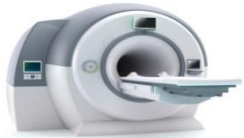
- Delivers embedded operating system platforms to 1000s of companies
  - Linux, Android, VxWorks
  - 10,000s of open source components in over a billion devices served

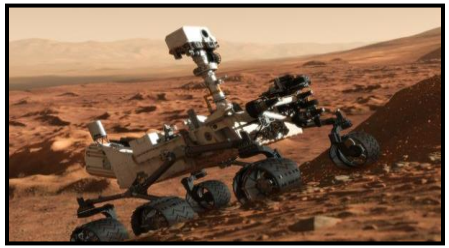
- Biggest competitor: roll your own Linux

- Extra pressure to get compliance right
  - Must mitigate risk for customers too
  - OpenChain Conforming

OPENCHAIN CONFORMANCE 1.1

- Independent wholly owned by Intel





Wind River Delivers SPDX Data to Customers

2012 - **Wind River** Linux 5
2013 - **Wind River** Linux 6
2014 - **Wind River** Linux 7
2015 - **Wind River** Linux 8
2016 - **Wind River** Linux 9
2015 –Titanium/OpenStack
2016 – Pulsar Linux
2016 – Helix Auto
2016 – Android
2017 – VxWorks 7

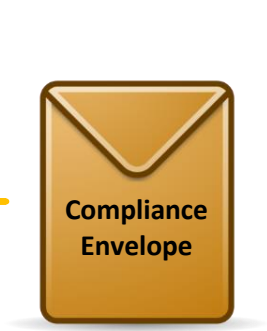
Agenda

- Describe the supply chain challenge
- Discuss how the Hyperledger Blockchain platform is critical to the solution
- Discuss how SPDX, OpenChain, Hyperledger are highly complementary
- Summary
- Q & A

The Challenge

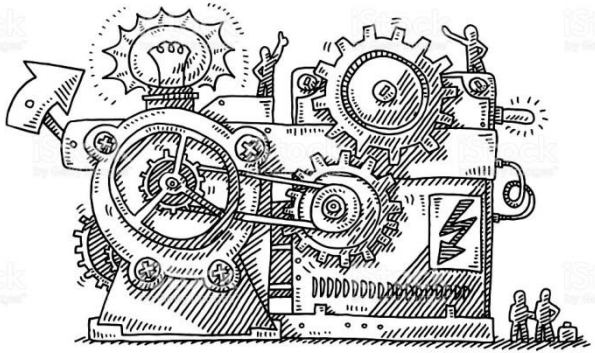
IoT/Embedded Device Requirement

- Most modern day devices are constructed from 80%+ open source
- Device Runtime is governed > 100 licenses
- Every shipping device requires open source compliance artifacts:
    i. Source Code
    ii. Legal Notices
    iii. SPDX data
    iv. Open Source Bill of Materials
    v. Security Vulnerability Report
    vi. Cryptography info

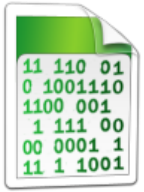


OPENCHAIN CONFORMANCE 1.1

[Compliance Program]



Software Part



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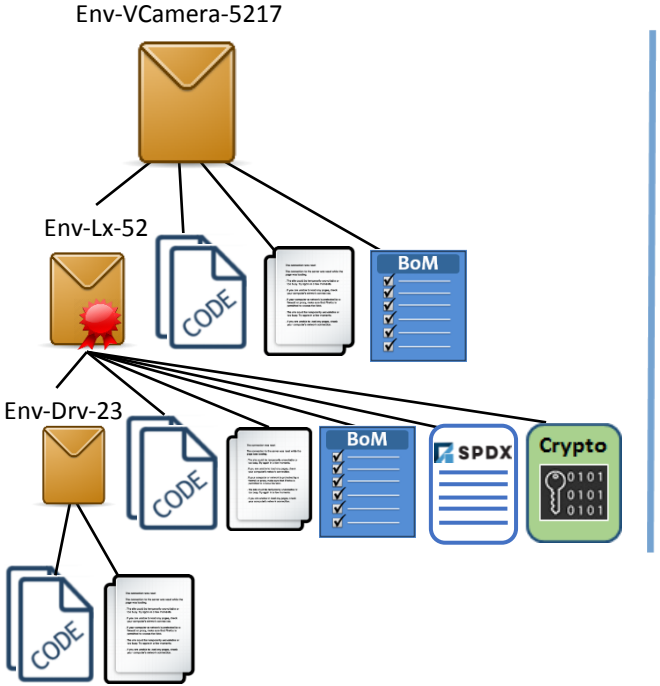
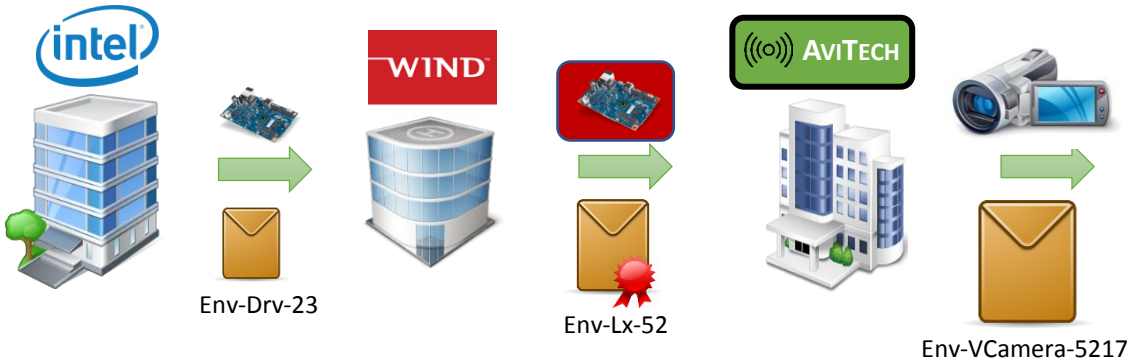
IoT/Embedded Device Requirement

The Supply Chain Challenge

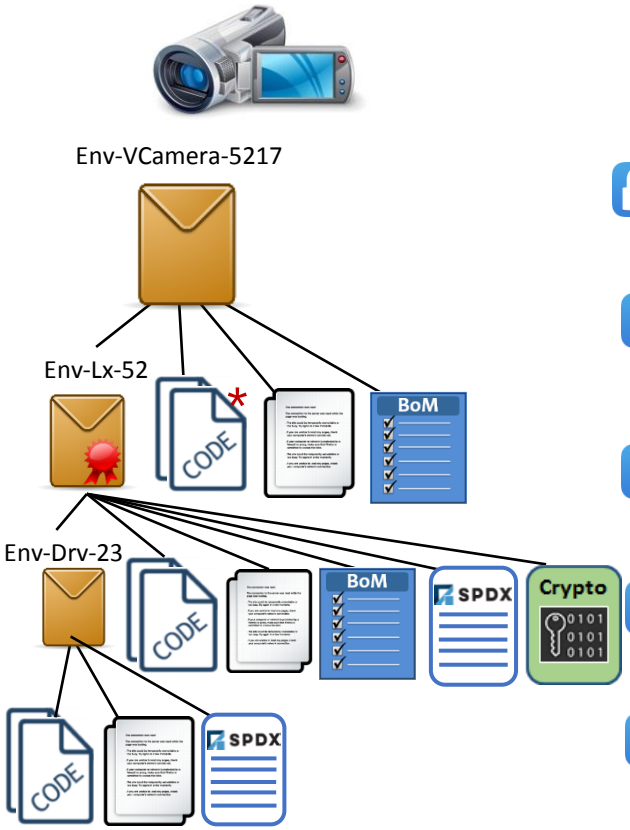




*Other names and brands may be claimed as the property of others.

Solution

Shared Ledger



Envelope ID	Supplier	Action	Artifacts
Env-Drv-23	Intel-ID	create	CODE
Env-Lx-52	WR-ID	create	Env-Drv-23, CODE, BoM, SPDX, Crypto
Env-VCam-5217	AvTec-ID	create	Env-Lx-52, CODE, BoM
Env-Drv-23	WR-ID	add	SPDX
Env-VCam-5217	AvTec-ID	update	CODE

ID	Org	Artifact
233	Ace	source
491	Ace	notice
524	NTex	source
901	NTex	SPDX

ID	Org	Artifact
233	Ace	source
491	Ace	notice
524	NTex	source
901	NTex	SPDX

ID	Org	Artifact
233	Ace	source
491	Ace	notice
524	NTex	source
901	NTex	SPDX

HYPERLEDGER Sawtooth

ID	Org	Artifact
233	Ace	source
491	Ace	notice
524	NTex	source
901	NTex	SPDX

ID	Org	Artifact
233	Ace	source
491	Ace	notice
524	NTex	source
901	NTex	SPDX

ID	Org	Artifact
233	Ace	source
491	Ace	notice
524	NTex	source
901	NTex	SPDX

ID	Org	Artifact
233	Ace	source
491	Ace	notice
524	NTex	source
901	NTex	SPDX

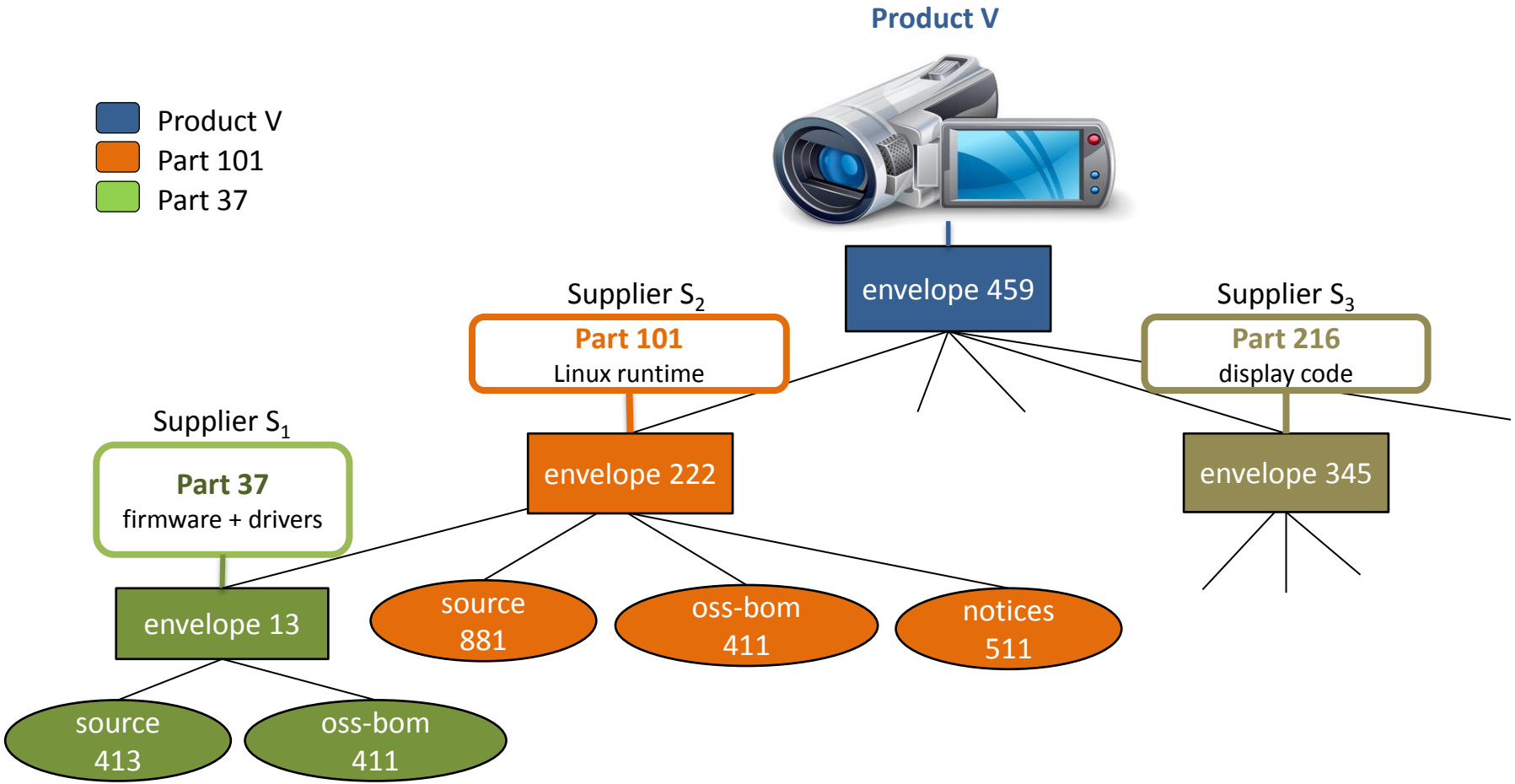
The Technology

Sawtooth Blockchain

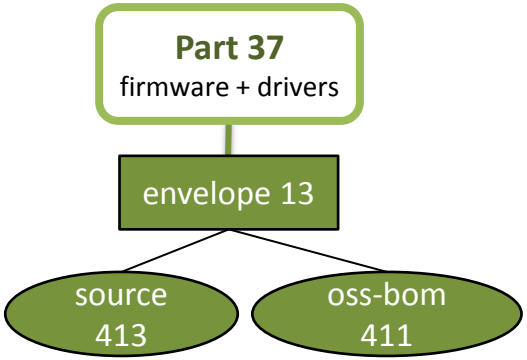
- A digital ledger that maintains a historical record of executed transactions
- Like a database it can record information of various types (e.g., artifacts: 

)
- Unlike databases it uses cryptography to ensure each record is immutable 
- Data is replicated across a network of servers (ledger nodes) 
- Which eliminates the need for central authority or middleman
- Achieving secure record preservation and data integrity 

… thereby establishing accountability & trust among all supply chain participants


Product V
Product V
Part 101
Part 37
envelope 459
Supplier S_2
Part 101
Linux runtime
Supplier S_3
Part 216
display code
Supplier S_1
Part 37
firmware + drivers
envelope 222
envelope 345
envelope 13
source
881
oss-bom
411
notices
511
source
413
oss-bom
411

Software Parts Ledger



Part 37

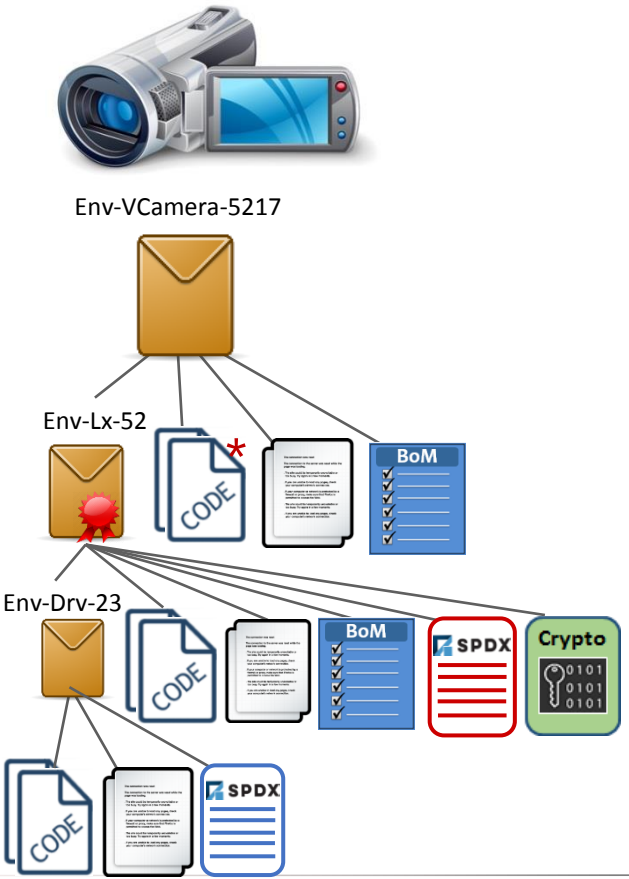
104	ADD_ARTIFACT oss-bom-413 TO envelope-13	Oct 14
103	ADD_ARTIFACT source-413 TO envelope-13	Oct 14
102	CREATE_ENVELOPE e-13 FOR part-37	Oct 12
101	CREATE_PART part-37 FOR supplier-S1	Oct 11

Software Parts Ledger

112	UPDATE source-881 WITH source-919 IN envelope-222	Nov 8
111	ADD_ARTIFACT notices-824 TO envelope-13	Nov 5
110	ADD_ARTIFACT oss-bom-97 TO envelope-222	Nov 1
109	ADD_ARTIFACT notices-511 TO envelope-222	Nov 1
108	ADD_ARTIFACT source-88 TO envelope-222	Nov 1
107	ADD_ARTIFACT envelope-13 TO envelope-222	Nov 1
106	CREATE_ENVELOPE e-222 FOR part-101	Oct 30
105	CREATE_PART part-101 FOR supplier-S2	Oct 30
104	ADD_ARTIFACT oss-bom-413 TO envelope-13	Oct 14
103	ADD_ARTIFACT source-413 TO envelope-13	Oct 14
102	CREATE_ENVELOPE e-13 FOR part-37	Oct 12
101	CREATE_PART part-37 FOR supplier-S1	Oct 11

Video Camera Model 5217

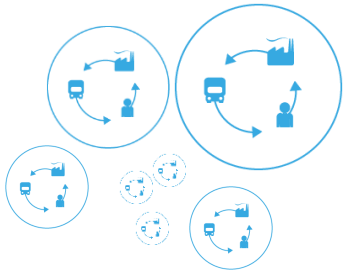
Video Camera Model 5217



Demo

Additional Considerations

- Supplier can keep artifact data private and share selectively
- Suppliers are not required to have mature compliance program to participate
- No fix requirements around artifact types or formats (notices, BoMs, …)
- We anticipate many semi-private and public supply chains
  - Automotive, Aerospace, Medical Devices, Consumer verticals, …
  - Single OEM/ODM can create a network with its suppliers
  - Linux Foundation could create a public ledger for it's projects
  - Large companies could use internally to coordinate among multiple business units



- The ledger can manage more than license compliance information (BoM, crypto, vulnerabilities, certifications, …)

Current Status & How to Participate

- The SParts project provides a software ledger built on the Sawtooth platform. Source code is available:

  https://github.com/Wind-River/sparts

- Live demos exists, will make public in 2018 Q1
- Looking for a neutral home for the SParts project
- Production 1.0 available in 2018 Q2 (finalizing access credential management)
  - Will support: source code, notices, SPDX data, OpenChain Status
- Participation
  - Host a ledger node (easy - download and run container)
  - Contribute to requirements & roadmap – especially ODMs/OEMs and their suppliers
  - Contributors: Developers, Documentation, website design, …

Summary

- Implementing and deploying a compliance program can be challenging
- Coordinating among suppliers adds another level of complexity
- The combination of SPDX, OpenChain and Hyperledger initiatives can greatly facilitate the task
- The Sawtooth Blockchain platform in particular:
  i. Enables a supply chain to construct a shared Software Parts ledger
  ii. Where immutable and replicated records are securely preserved
  iii. Without the need for a central authority or middleman
- To deliver the accountability required to establish trust among all the supply chain participants

Contact

https://github.com/Wind-River/sparts

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