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June 16th, 2020

Damage in your supply chain? Using RFID to Deter Detect and Diagnose

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Today's Presenters



Jan van Niekerk

VP Engineering, SpotSee.IO

Jan van Niekerk has directed the engineering team at SpotSee since January 2018. He brings over 20 years of experience in firmware, microcontrollers, analog, TCP/IP, RF/RFID and security. Jan has managed the development of electronic solutions for tier-1 OEMs at Microchip Technology, Maxim Integrated Products, Intellex Corp. and RF Ops.

Today's Presenters



Todd Blumer Co-founder and President SDG Systems

Todd is an IT industry veteran with more than 30 years' experience with specialties in mobile, cloud and data collection, including RFID. He has significant industry experience in leadership, software and technical marketing at companies, such as FORE Systems, Marconi and Data General. Todd holds a Master's degree in Computer Science from Clemson University.



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Agenda

Today's Presenters



Damage

RFID and Impact

Deter

Detect

Diagnose

Summary

Today's Presenters

Jan van Niekerk

VP Engineering, SpotSee

Todd Blumer

President, SDG Systems

Background: Jan van Niekerk

- Microchip Technology
 - Semiconductor/Remote Keyless Entry
- Maxim Integrated
 - Semiconductor/RFID
- Intellexflex
 - RFID
- RF OPS
 - Consulting



SpotSee: ShockWatch to RFID

1974

Glass tube



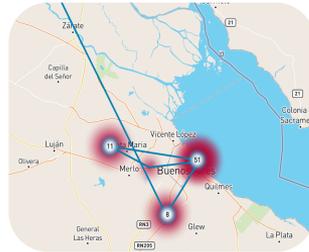
1995

ShockLog



2015-2016

Connectivity



2017-2018

Expanding
connected
portfolio



2019

RFID



Background: Todd Blumer



SDG Systems

- Co-founder and President
- Technologist with focus on RFID, mobile and IoT
- Business Development

FORE Systems / Marconi

- Technical marketing
- Software and firmware development



SDG Systems and TallyFlow

- SDG Systems' purpose is to help companies solve their business problems by uniting technology, service and relationships.
- Founded in 2001
- Expertise spans from IoT to the cloud with a focus on RFID
- TallyFlow – cloud-based tracking solution designed to reduce waste and improve productivity and safety.
- TallyPoint RAIN RFID Reader – intelligent edge reader built on technologies that focus on robustness and security.



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Damage

\$2.3 Trillion shipping damage annually!



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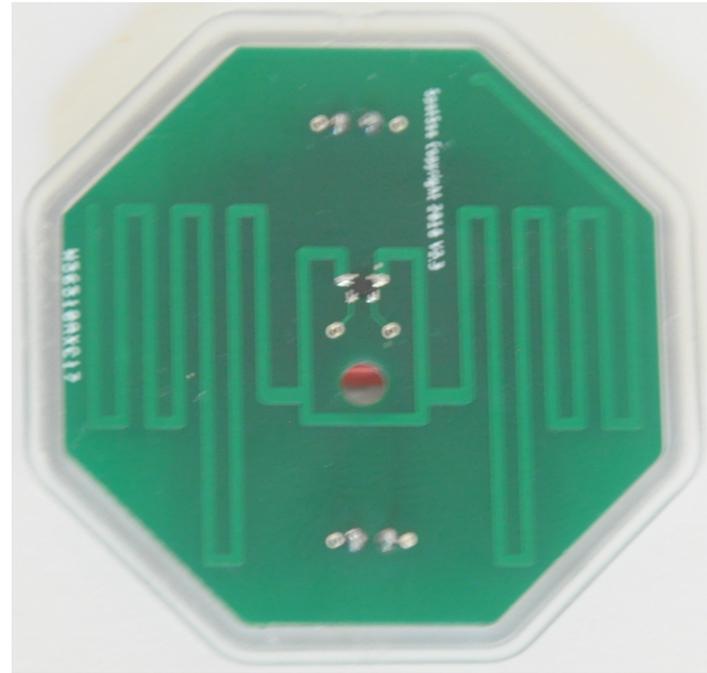
Summary

SpotSee's ShockWatch Indicator



Combining RFID + Impact

Bundling standard EPC GEN2 tag with impact detector



RFID tag has no battery (passive)

- Powered by RF energy from the reader
- Small Size
- Low Cost
- Unlimited shelf life
- Robust temperature behavior
- **Limited Range**

Chokepoints Concept

RFID chip requires
1/10th of a milliwatt.

Normal radio receiver
is a million times more
sensitive.



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Deter

DETER

The knowledge that cargo is actively being monitored deters bad handling behavior by supply chain participants.

40-60% typical reduction in damage!

Deter Example



ac·count·a·bil·i·ty

/əˌkoun(t)əˈbɪlədē/

noun

the fact or condition of being accountable; responsibility.
"their lack of accountability has corroded public respect"

Similar:

responsibility

liability

answerability

reporting

WARNING
MONITORED SHIPMENT

Patent # 8,234,984

RED
INDICATES
ROUGH
HANDLING.

SHOCKWATCH RFID
A123456
INSPECT IF RED
15G
www.spotsee.io

RED
INDICATES
ROUGH
HANDLING.

IF SHOCKWATCH 2 INDICATOR IS RED:

- 1 Do not refuse shipment.
- 2 Make notation on delivery receipt and inspect for damage.
- 3 If damage is discovered, leave item in original container and packaging, and request immediate inspection from carrier within 15 days of delivery date (3 days for international).

SHOCKWATCH[®]

www.shockwatch.com 214.736.4580

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DETER

The knowledge that cargo is actively being monitored deters bad handling behavior by supply chain participants.

DETECT

Connected monitoring enables real-time damage detection so costs are minimized, and responsible parties are held accountable.

40-60% typical reduction in damage!

Detect - TallyPoint RFID



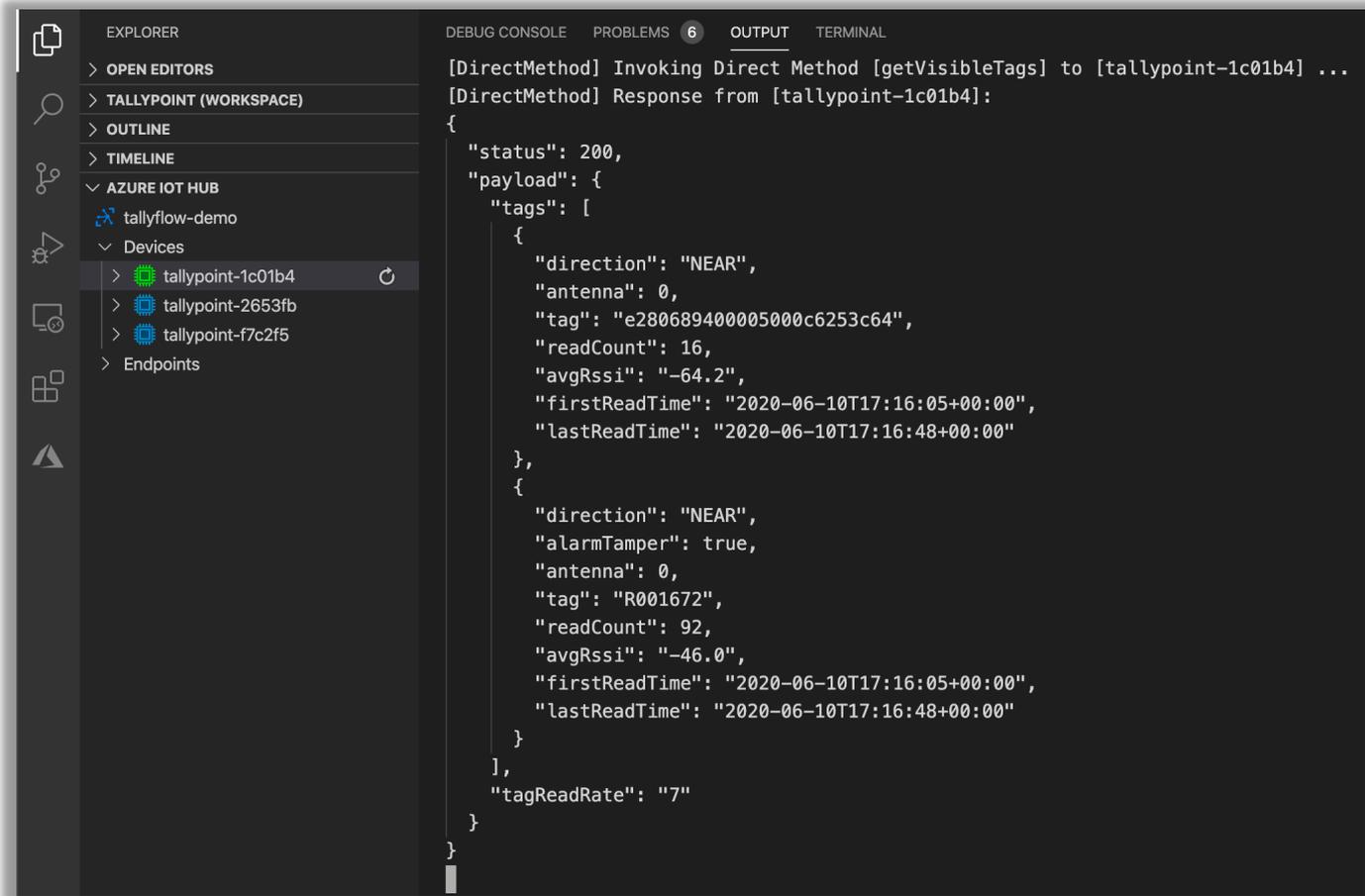
TallyPoint RF-1 RAIN RFID Reader

- Intelligent 4-port edge reader
- Focus on security and robustness
- Flexible plug-in software architecture
 - Send data to Azure, GCP, AWS
 - Send data to TallyFlow Cloud
 - Send JSON to any server over message queue (AMQP, MQTT)



Azure

For the geek!



```
EXPLORER
> OPEN EDITORS
> TALLYPOINT (WORKSPACE)
> OUTLINE
> TIMELINE
AZURE IOT HUB
  tallyflow-demo
    Devices
      tallypoint-1c01b4
      tallypoint-2653fb
      tallypoint-f7c2f5
    Endpoints

DEBUG CONSOLE  PROBLEMS 6  OUTPUT  TERMINAL
[DirectMethod] Invoking Direct Method [getVisibleTags] to [tallypoint-1c01b4] ...
[DirectMethod] Response from [tallypoint-1c01b4]:
{
  "status": 200,
  "payload": {
    "tags": [
      {
        "direction": "NEAR",
        "antenna": 0,
        "tag": "e280689400005000c6253c64",
        "readCount": 16,
        "avgRssi": "-64.2",
        "firstReadTime": "2020-06-10T17:16:05+00:00",
        "lastReadTime": "2020-06-10T17:16:48+00:00"
      },
      {
        "direction": "NEAR",
        "alarmTamper": true,
        "antenna": 0,
        "tag": "R001672",
        "readCount": 92,
        "avgRssi": "-46.0",
        "firstReadTime": "2020-06-10T17:16:05+00:00",
        "lastReadTime": "2020-06-10T17:16:48+00:00"
      }
    ],
    "tagReadRate": "7"
  }
}
```

Detect - TallyFlow



TallyFlow Client and Server Software

- Item and personnel tracking and reports
- Reader assignment and management
- Zone creation and management
- Damage detection and notifications



| Tag | Time | Direction | Endpoint | Antenna | Zone |
|------------------|------------------------|-----------|-------------------|---------|--------------|
| R001664X - ✓ - 🕒 | 2020-05-28 05:09:59 pm | NEAR | tallypoint-1c01b4 | 0 | Todd's House |

Detect – Live Demo



Using TallyPoint
Reader with TallyFlow
Software

A screenshot of the TallyFlow software interface. At the top, the 'TALLYFLOW' logo is displayed. Below it is a green Wi-Fi signal icon. The interface shows two sliders: 'antenna 0 enabled' (set to 'enabled'), 'power' (set to 21 dBm), and 'dwell' (set to 100 ms). Below the sliders, it indicates '7 tags'. A red box highlights the tag ID 'R001672'. Below this, a white box contains the following information: 'antenna 0, read 5948 times, avg rssi -45.9', 'first seen 47 minutes ago', 'last seen 0 seconds ago', 'present for 47 minutes', and 'alarm: true'. Below this is a white box with the hexadecimal string 'e280689400005000c6253c64'. At the bottom, another white box contains the hexadecimal string '5108190712002f0400018125'.

TALLYFLOW

antenna 0 enabled ▼

power 21 dBm

dwell 100 ms

7 tags

R001672

antenna 0, read 5948 times, avg rssi -45.9
first seen 47 minutes ago
last seen 0 seconds ago
present for 47 minutes
alarm: true

e280689400005000c6253c64

5108190712002f0400018125

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Solving The Problem

DETER

The knowledge that cargo is actively being monitored deters bad handling behavior by supply chain participants.

DETECT

Connected monitoring enables real-time damage detection so costs are minimized, and responsible parties are held accountable.

DIAGNOSE

Data and analytics provided by shipment monitoring enable the diagnosis and elimination of pain points within the supply chain.

40-60% typical reduction in damage!

Diagnose

The screenshot displays the TallyFlow web application interface. The top navigation bar includes a hamburger menu, the text 'TallyFlow', a search icon, and a close button. The left sidebar shows the 'PITTSBURGH' location and a menu with options: Home, Events, Items, Images, Reports, Workers, Admin, Configuration, Endpoints, Zones, and Organizations. The main content area is titled 'Spotsee1664' and features 'SAVE' and 'DELETE' buttons. Below the title are tabs for 'BASIC', 'EVENTS', and 'PHOTO'. The configuration details are as follows:

| | | | | | |
|---------------|---------------------------|----------------------|--------------------------|----------------------|--------------------------|
| Name | Spotsee1664 | Tag1 | e200680b0000000000000000 | Tag2 | R001664X |
| Serial | R001664 | Class | item | Time Created | 2020-03-06T15:02:14.178Z |
| Time Modified | 2020-05-19T14:26:08.225Z | | | | |
| Description | | | | | |
| Last Event | 2020-05-29T15:18:16Z | Last Endpoint Change | 2020-05-28T21:09:59Z | Last Zone Transition | 2020-05-28T21:09:59Z |
| Zone | Pittsburgh / Todd's House | Endpoint | tallypoint-1c01b4 | | |
| Alarm | true | Alarm Tag | e200680b0000000000000000 | Alarm Time | 2020-04-08T17:37:31Z |

Diagnose

Regular supply chain data

- Source, Destination, Route Count, Weight, Volume, Value

+ Impact information

- Time & location of alarm choke point
- Magnitude of impact

Diagnose

Compound effects of big data

- What shipper causes most damage
- What routes cause more damage
- What storage & handling facilities cause damage
- What port
- Seasonal / diurnal / other periodic effects

Diagnose

Ability of RF to penetrate packaging enables internal/external impact detection and thus utility of packaging

Combine with more sophisticated SpotSee impact recorders to discover root causes of damage

Use Case

Data center provider

Server Racks



Use Case

Office furniture maker



Conclusion

DETER

The knowledge that cargo is actively being monitored deters bad handling behavior by supply chain participants.

DETECT

Connected monitoring enables real-time damage detection so costs are minimized, and responsible parties are held accountable.

DIAGNOSE

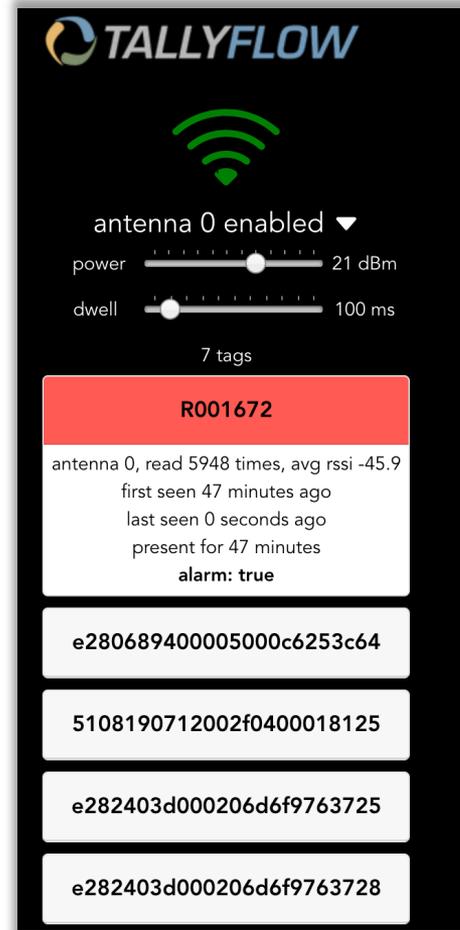
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40-60% typical reduction in damage!

Contact Us

- SpotSee.io -
info@spotsee.io
- SDGSystems.com -
info@sdgsystems.com

Appendix – Tallyflow Screenshot 1



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ANNUAL CONFERENCE
AND EXHIBITION
ORANGE COUNTY
CONVENTION CENTER
ORLANDO • FLA.

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