DevCon 2025

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ZEBRA

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Harness Cloud Connectivity: Integrate Zebra Printers with Modern Systems

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Cloud Application Printing

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Cloud Application Printing

Overview

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Server Side	Client Side
• Printer connected to cloud server • Client is logically tied to printer • Server triggers print operation to printer	• Printer is connected to client • Client controls printing
+ Universal printing from any browser	+ Simple connection
	+ Immediate feedback on connection
– More involved connection process	– Client access to printer not universal across browsers and operating systems

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Client Printing

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Windows and CUPS Drivers

Base Printing Option

- Create a view that is just your label
- Format it to a size equivalent to label in the printer
- Call print function that brings up the print dialog
- Browsers supported: All
- OS support: Windows, Mac, Linux
- Ports: TCP, USB

– Too many clicks and options to print

– No mobile support

– Graphics only

Android Print Service

Base Printing Option

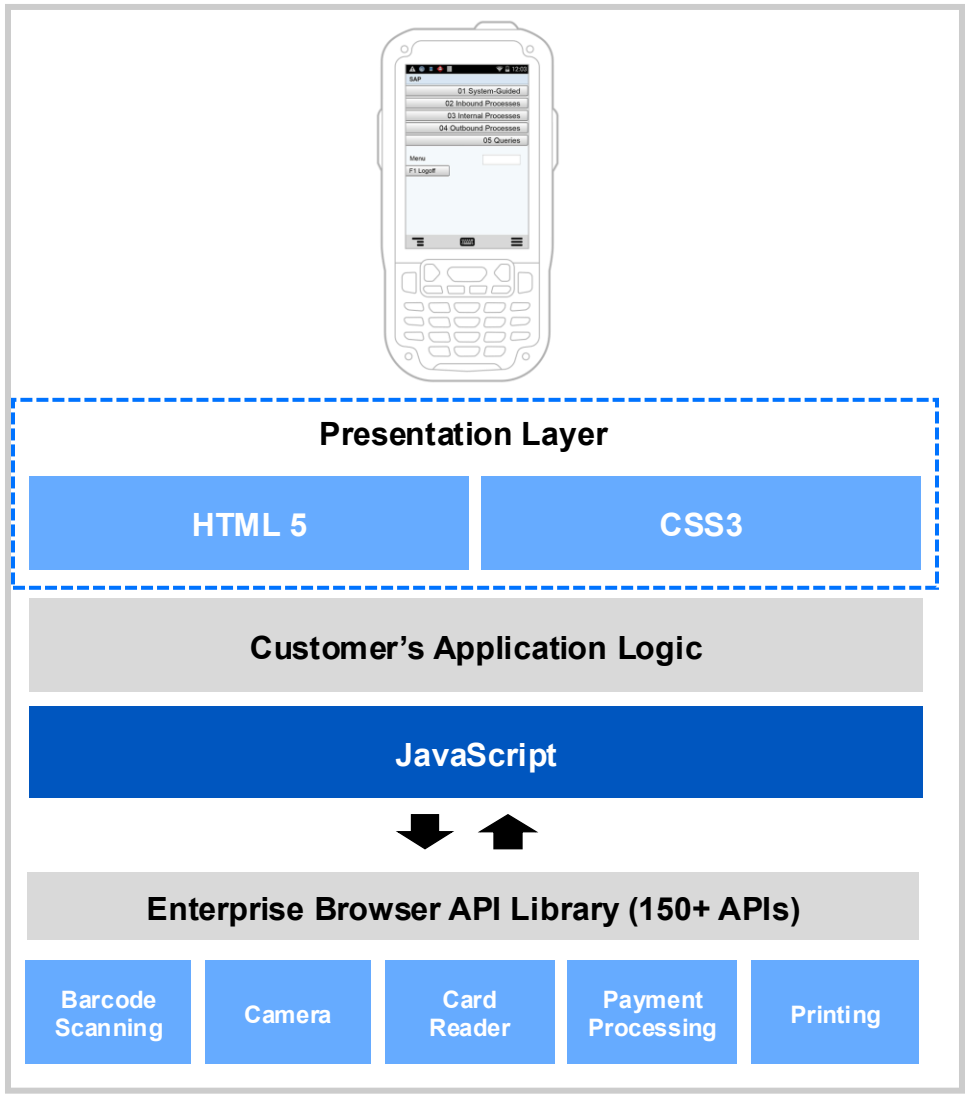
- Create a view that is just your label
- Format it to a size equivalent to label in the printer
- Call print function that brings up the print dialog
- Browsers supported: All
- OS support: Android
- Ports: TCP, BT, USB

– Too many clicks and options to print

– Only Android

– Graphics only

Enterprise Browser



1. Enterprise Browser is a powerful, industrial browser that provides everything needed to quickly build device apps for **barcode scanning, signature capture, payment processing, printing** and most other enterprise applications.

2. Enterprise Browser is currently supported on Zebra devices running Android or Windows Mobile/CE.

3. EB includes a runtime environment inside which a company's application logic can be executed and controlled using HTML5 and CSS3 for presentation and JavaScript to access EB APIs for scanners, cameras, card readers and other device peripherals.

4. The base EB installation has all of the components that would allow a Windows development host to easily build apps and set runtime settings (via Config.xml file) for local for local or mass-deployment using Zebra StageNow or a mobile device management (MDM) system.

BrowserPrint

https://developer.zebra.com/products/printers/browser-print

- ZPL passthrough/bi-di
- Graphics printing support
- Status, config, and SGD helper functions
- Leverages loopback in Javascript via localhost to communicate to BrowserPrint application
- Browsers supported: All
- OS support: Windows, MacOS, Android
- Ports: TCP, USB, BT (Android)

– Potential for browsers to stop support even though it is part of the w3c standard(Safari)

```
device.send("^XA^HH^XZ", function(success){
    device.read(function(response){
       console.log(response);
    }, function(error){console.error(error);});
}, function(error){console.error(error);});
```

```
BrowserPrint.convert("https://example.com/myimage.png", device, options, success, failure);
```

```
zebraPrinter.printImageAsLabel(url, function(){}, function(error){});
```

WebBT

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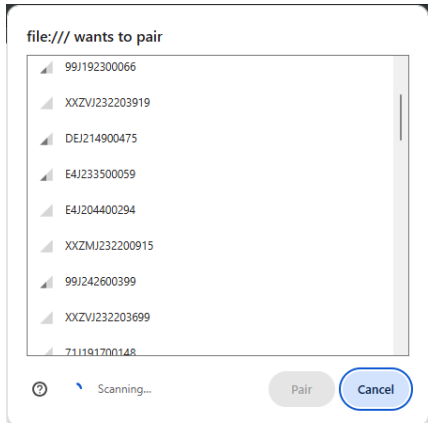
- Browser controls selection
- BlueTooth Low Energy

- Browsers supported: Chrome, Opera, Edge
- OS support: Android, Windows, Mac
- Ports: BLE

– Only BT and no iOS

– Performance varies




```
async sendCommand(command) {
    if (!this.isConnected) {
        throw new Error('Not connected to printer');
    }

    try {
        const encoder = new TextEncoder();
        const data = encoder.encode(command);

        // Split into chunks if needed
        for (let i = 0; i < data.length; i += MAX_CHUNK_SIZE) {
            const chunk = data.slice(i, i + MAX_CHUNK_SIZE);
            await this.writeCharacteristic.writeValue(chunk);
        }

        return true;
    } catch (error) {
        this.log(`Command failed: ${error.message}`, 'error');
        throw error;
    }
}
```

```
async connect() {
    try {
        this.log('Searching for Zebra printer...');

        this.device = await navigator.bluetooth.requestDevice({
            filters: [{ services: [0xfe79] }],
            optionalServices: [ZEBRA_SERVICE_UUID]
        });

        this.device.addEventListener('gattserverdisconnected', () => {
            this.handleDisconnect();
            if (this.autoReconnect && this.reconnectAttempts < this.maxReconnectAttempts) {
                this.reconnect();
            }
        });

        this.log('Connecting to GATT server...');
        this.server = await this.device.gatt.connect();

        this.log('Getting Zebra service...');
        this.service = await this.server.getPrimaryService(ZEBRA_SERVICE_UUID);

        this.log('Getting characteristics...');
        this.writeCharacteristic = await this.service.getCharacteristic(ZEBRA_WRITE_UUID);
        this.readCharacteristic = await this.service.getCharacteristic(ZEBRA_READ_UUID);

        await this.readCharacteristic.startNotifications();
        this.readCharacteristic.addEventListener('characteristicvaluechanged',
            (e) => this.handleNotifications(e));

        this.isConnected = true;
        this.reconnectAttempts = 0;
        this.updateUI();
        this.log('Successfully connected to printer');
        connectionStatus.textContent = 'Connected to printer';
        connectionStatus.className = 'status connected';

    } catch (error) {
        this.log(`Connection error: ${error.message}`, 'error');
        this.handleDisconnect();
    }
}
```

Hybrid App or Native Client

Logic wrapper

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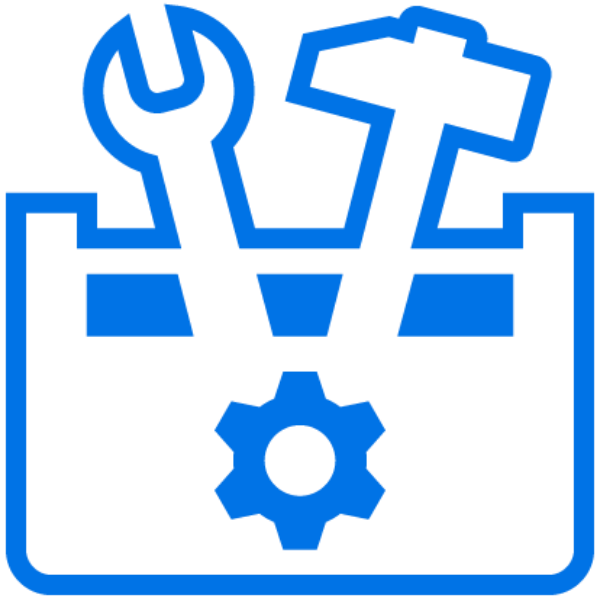
- Full custom control of devices
- Printer SDKs interfaced to control print



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Direct Server Connection

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Overview

Printer connects directly to server

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- CloudConnect
  - Print or configuration commands
  - Multiple pipes allowed for status during print
  - Basis of PPME, PPME Cloud, and SendFile2Printer API
  - Open Specification to build your own
  - Secure Websockets with JSON interface
- MQTT
  - Configuration only
  - Basis of Soti Connect
  - Tested against standard brokers (HiveMQ and Mosquitto)

A Printer connected directly to application back end allows front end to exist on any platform

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Cloud Connect

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Cloud Connect

Overview

Printing Needs

- Low latency downstream
- Firewall Navigation

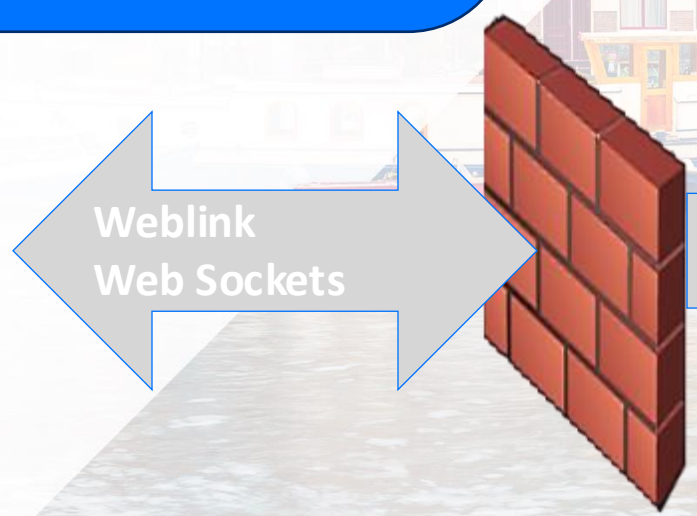
Websockets

- Secure TLS
- Lower overhead than HTTPS
- Persistent connection
- Low latency

- Need to account for server burden

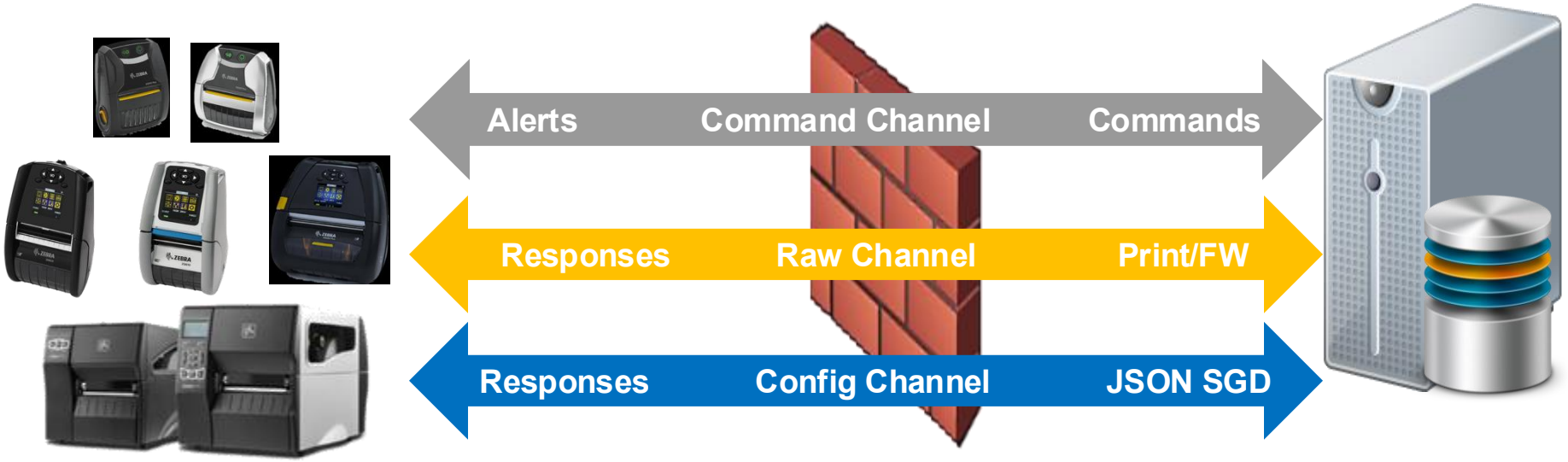
Weblink

- Multi-channel Websockets
- Mature - 10+ years



Cloud Connect

Connections




```
{
  "open" : "v1.raw.zebra.com"
}
```

```
{
  "open" : "v1.config.zebra.com"
}
```

```
{
  "configure_alert" : "HEAD OPEN,SDK,Y,Y,,,N"
}
```

```
{
  "alert" :
    {
        "unique_id" : "XXXYYYZZZ",
        "time_stamp" : "2015-06-09 03:38:12",
        "type_id" : "ERROR",
        "condition_id" : "HEAD OPEN",
        "condition_state" : "SET",
        "type" : "ERROR CONDITION",
        "condition" : "HEAD OPEN"
    }
}
```

Cloud Connect

Connection Overview

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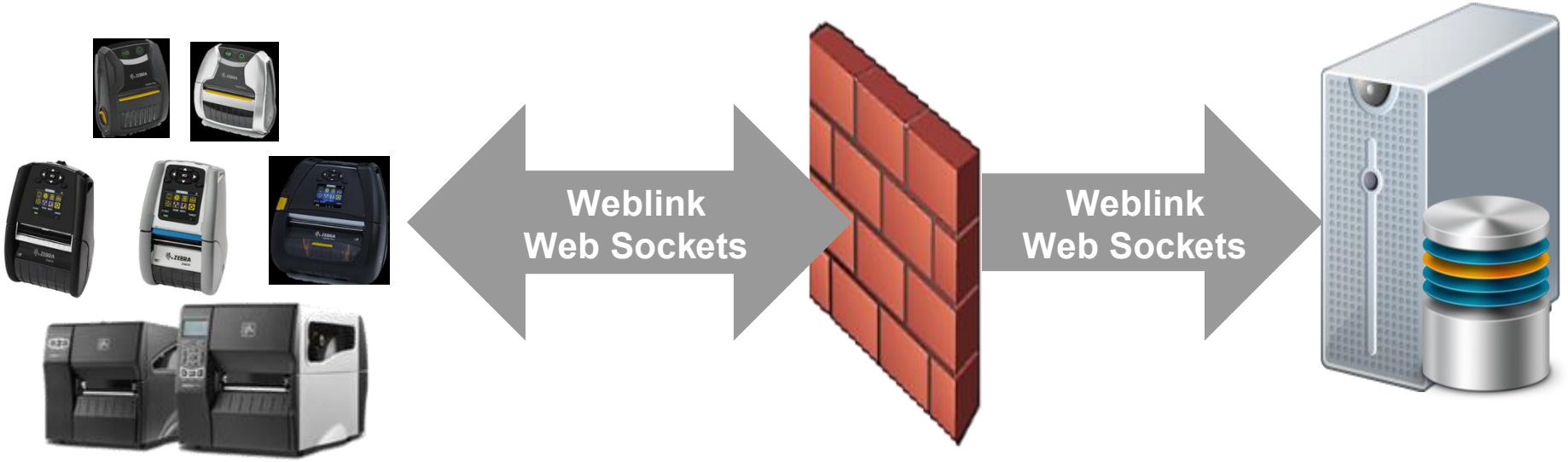
1. Server and printer preloaded with certificates for mutual authentication
2. Printer initiates HTTPS connection to server.
   - Initiate TLS connection
   - Printer requests the server's certificate to verify it is an authorized server.
   - Server requests the printer's certificate to verify it is an authorized printer.
3. Request Upgrade to Web Sockets
4. Server agrees to upgrade & communication is Web Sockets after that.
5. Command channel established and printer sends the server its discovery packet.



Cloud Connect

Certificates

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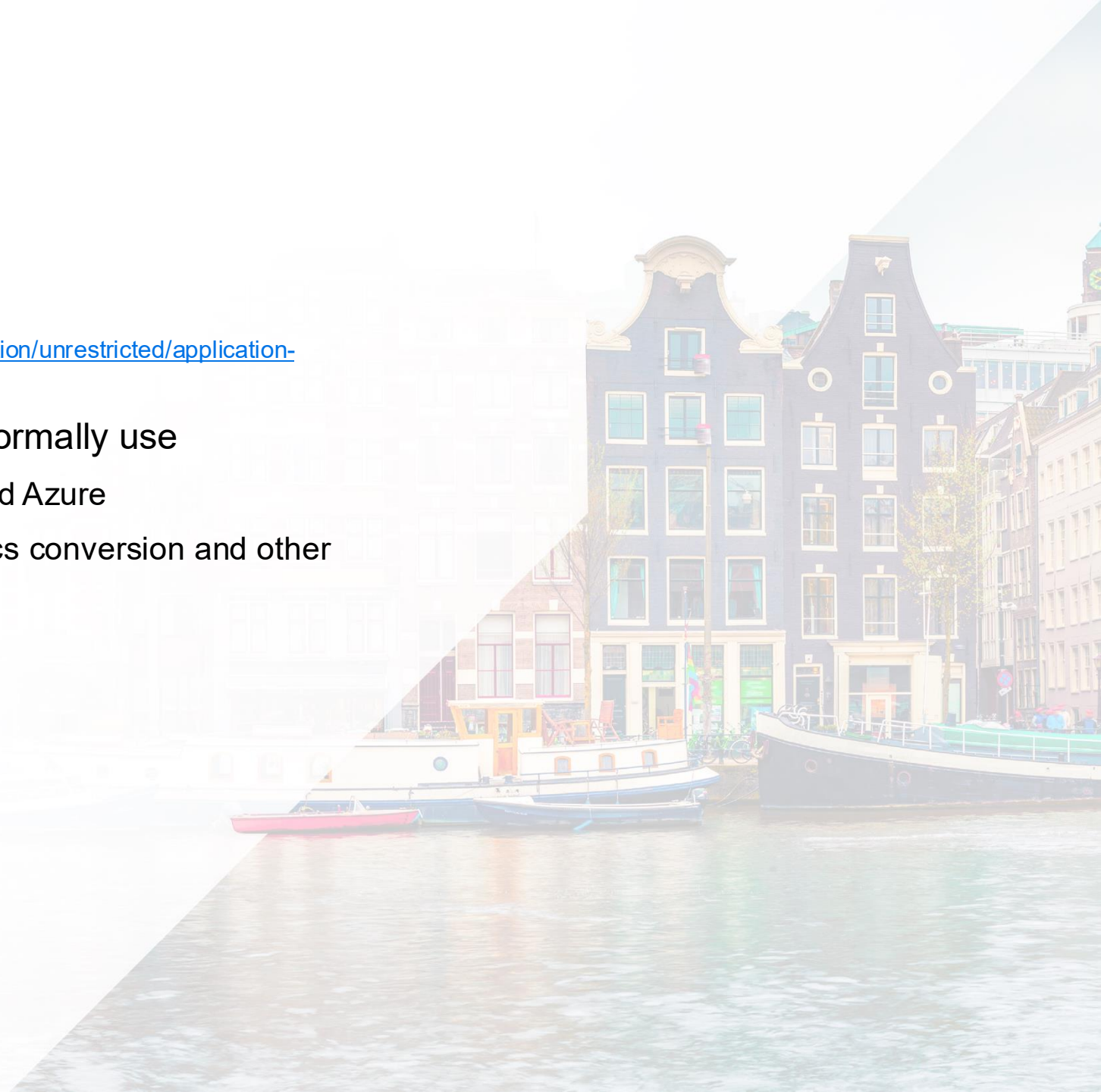
- Zebra CA shutdown
- Self generated certs created unique pairing between printer and server
- PPME will generate or allow certs to be uploaded
- SendFile2Printer (SF2P) uses built in Zebra certificate
  - No printer side certificate loading required

Self Implemented

- Documentation
  - https://www.zebra.com/content/dam/support-dam/en/documentation/unrestricted/application-notes/appnotes-creating-weblink-endpoint-rev1-english.pdf
- Implement using frameworks and tools you normally use
  - Customers have implemented on AWS, GCP, and Azure
  - Language specific SDKs can be used for graphics conversion and other helpful features



SendFileToPrinter SF2P API

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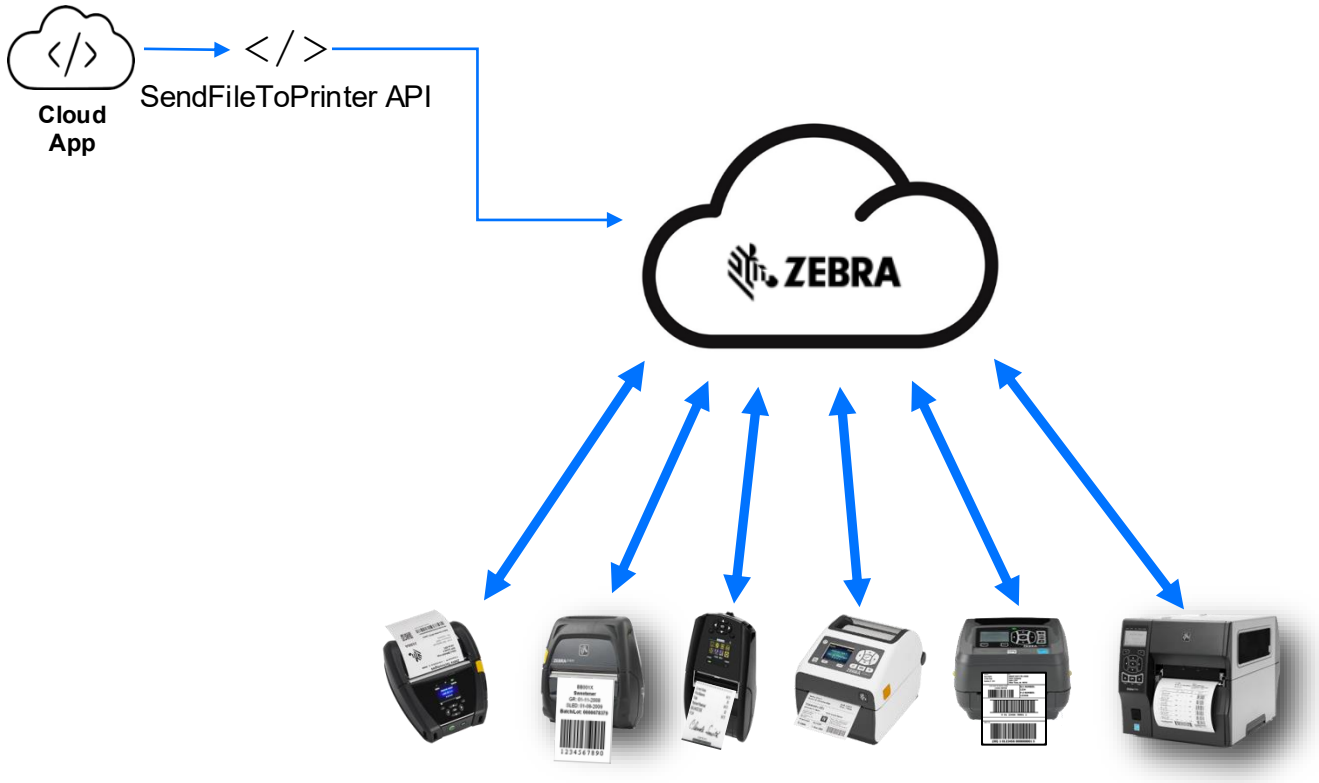
- Zebra hosts printer connections
- Connects raw channel to simple Rest API
  - ZPL, fonts, graphics, config
  - Unidirectional, 10MB limit per call
- Server to Server



What does the API look like?

https://developer.zebra.com/apis/sendfiletoprinter

A multipart/form-data HTTPS request

- Header:
  - API Key (**`apikey`**)
  - Tenant account number (**`Tenant ID`**)
- Request body
  - One or more printer serial numbers (**`sn`**)
  - One file to be sent to the printer (**`zpl_file`**)
- Request URL
  - `https://api.zebra.com/v2/devices/printers/send`

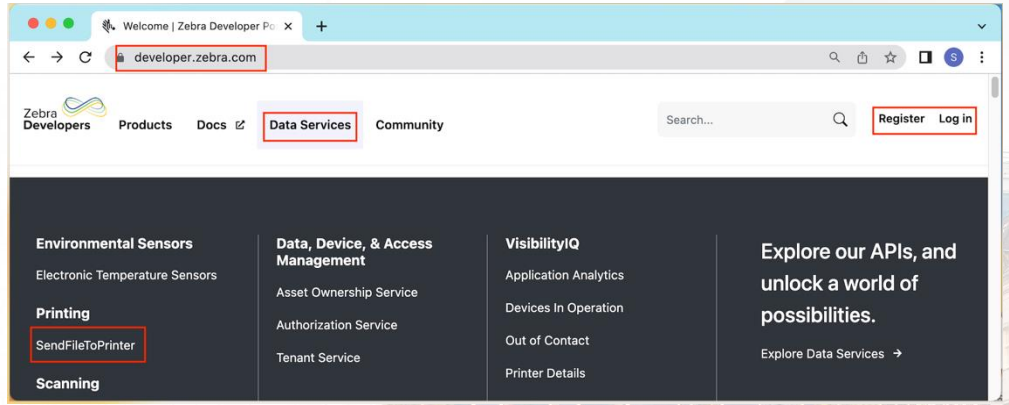
```
$ curl -H "apikey: yourApiKey" -H "tenant: yourTenantAccountNumber" \
       -F "sn=printerSerialNumber_1" \
       -F "sn=printerSerialNumber_2" -F "zpl_file=@HelloWorld.txt" \
       https://api.zebra.com/v2/devices/printers/send
```

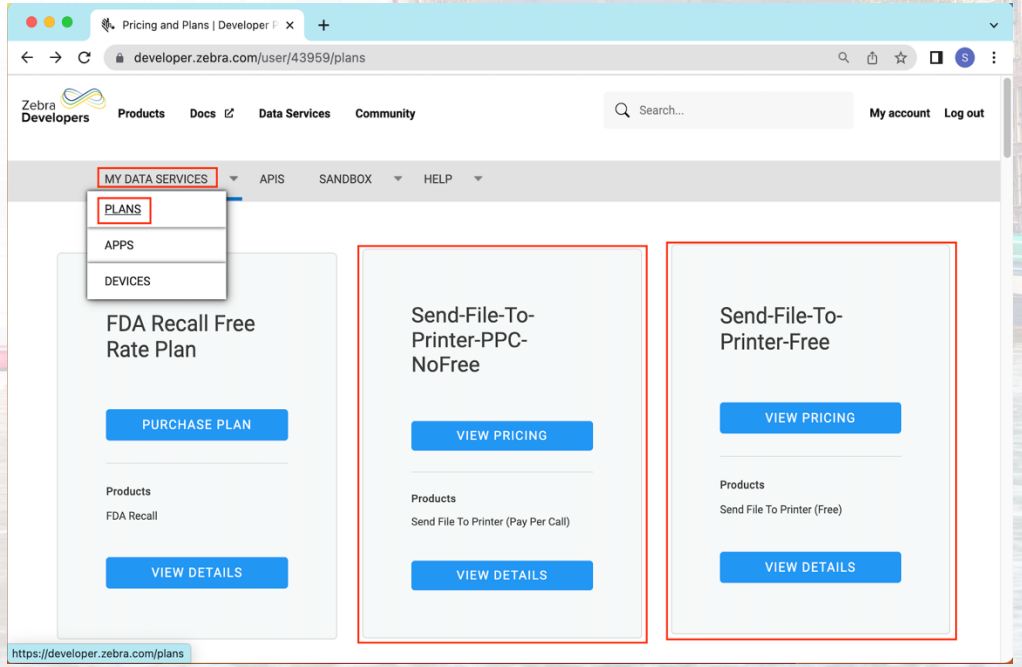
How to Get Started?

Create an account & add the SendFileToPrinter plan(s)

- Apply for a developer account at https://developer.zebra.com

- Follow the instructions in Getting Started with Zebra Data Services guide to
  - Select the SendFileToPrinter (Free, PPC, or both) plan(s)
  - Add the plan(s) to your account
- Free Plan
  - 100 calls per day per API key
- Pay Per Call (PPC) Plan
  - Prepaid
  - $0.01 per call (against the account balance)

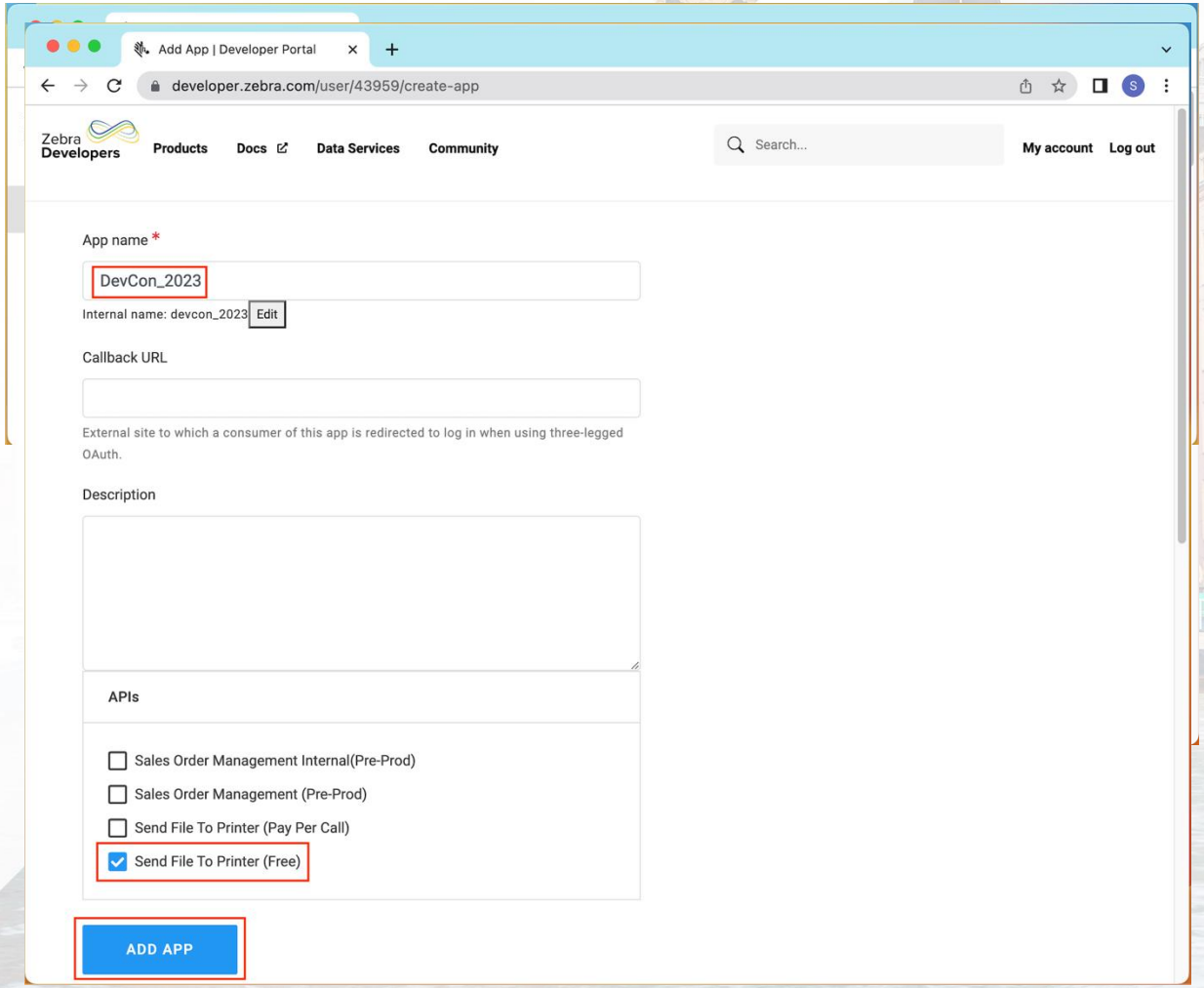




How to Get Started? – cont.

Create an app

- Create an app
  - Click on **My Account -> My Apps -> My Apps**
  - Click on **Add app**
- Give the app a name
- Check-mark only one of the “Send File To Printer” plans under **APIs** list
  - Do not choose both PPC and Free plans, otherwise both plans get deducted from the API calls.
- Click on **ADD APP** button



How to Get Started? – cont.

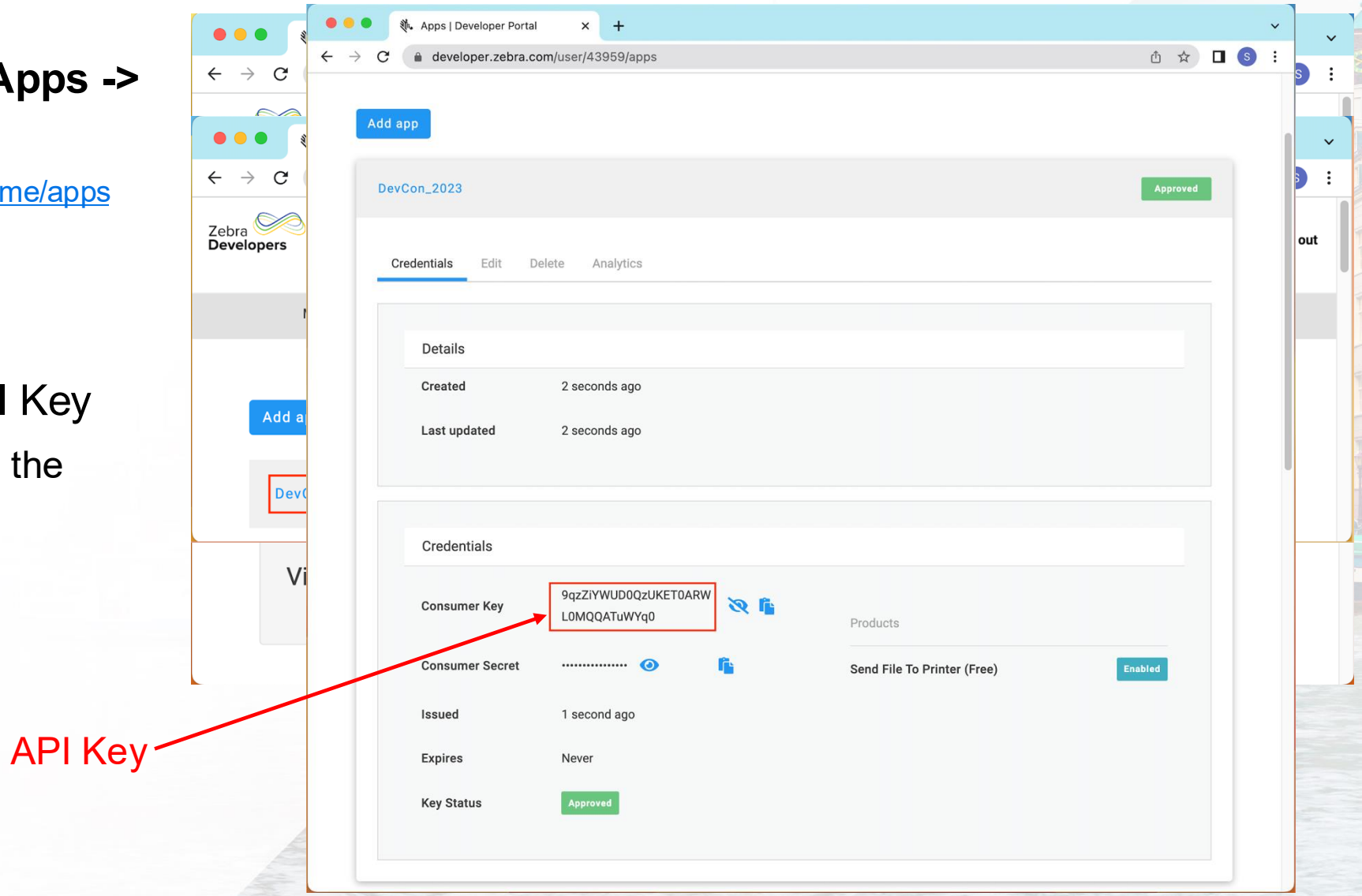
Get the API Key

- Click on **My Account -> My Apps -> My Apps**

Direct link: https://developer.zebra.com/user/me/apps

- Open the app

- The Consumer Key is the API Key
  - Copy & paste this API key into the REST request header



How to Enroll a Printer?

Register the printer with Zebra Cloud

Obtain Printer Enrollment String

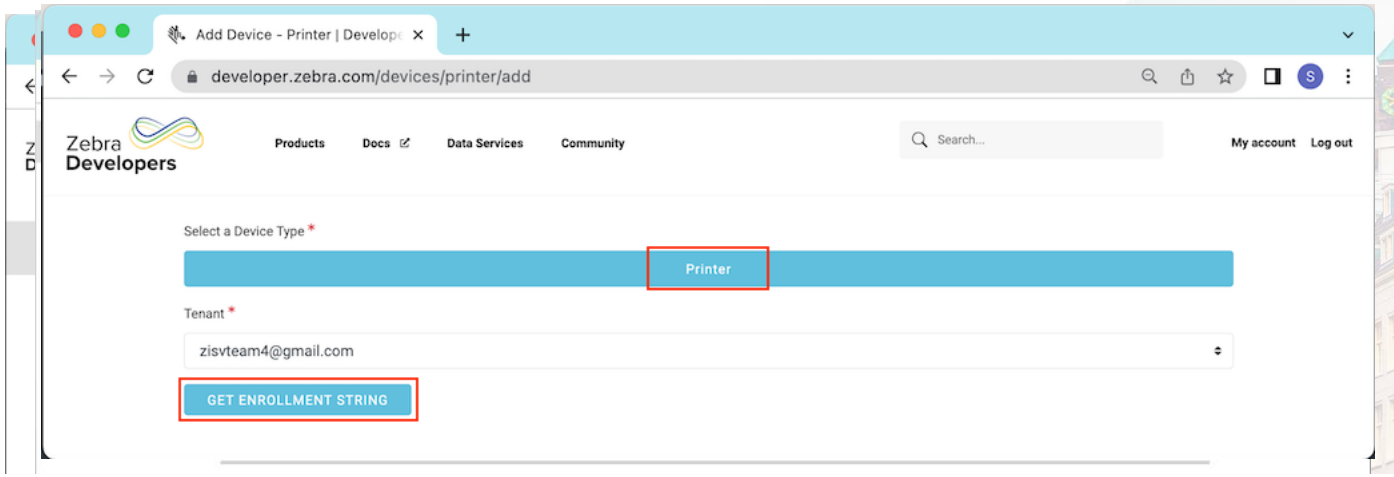
- Click on **Data Services -> SendFileToPrinter**
- Click on **MY DATA SERVICES -> DEVICES**

Direct link: https://developer.zebra.com/my-devices

- Click on **Add Device** button
- Select **Printer** on the dropdown
- Click on **Get Enrollment String**

Note:

1. Tenant ID can be retrieved via Tenant Service
2. Refer to Printer Setup Guide for details

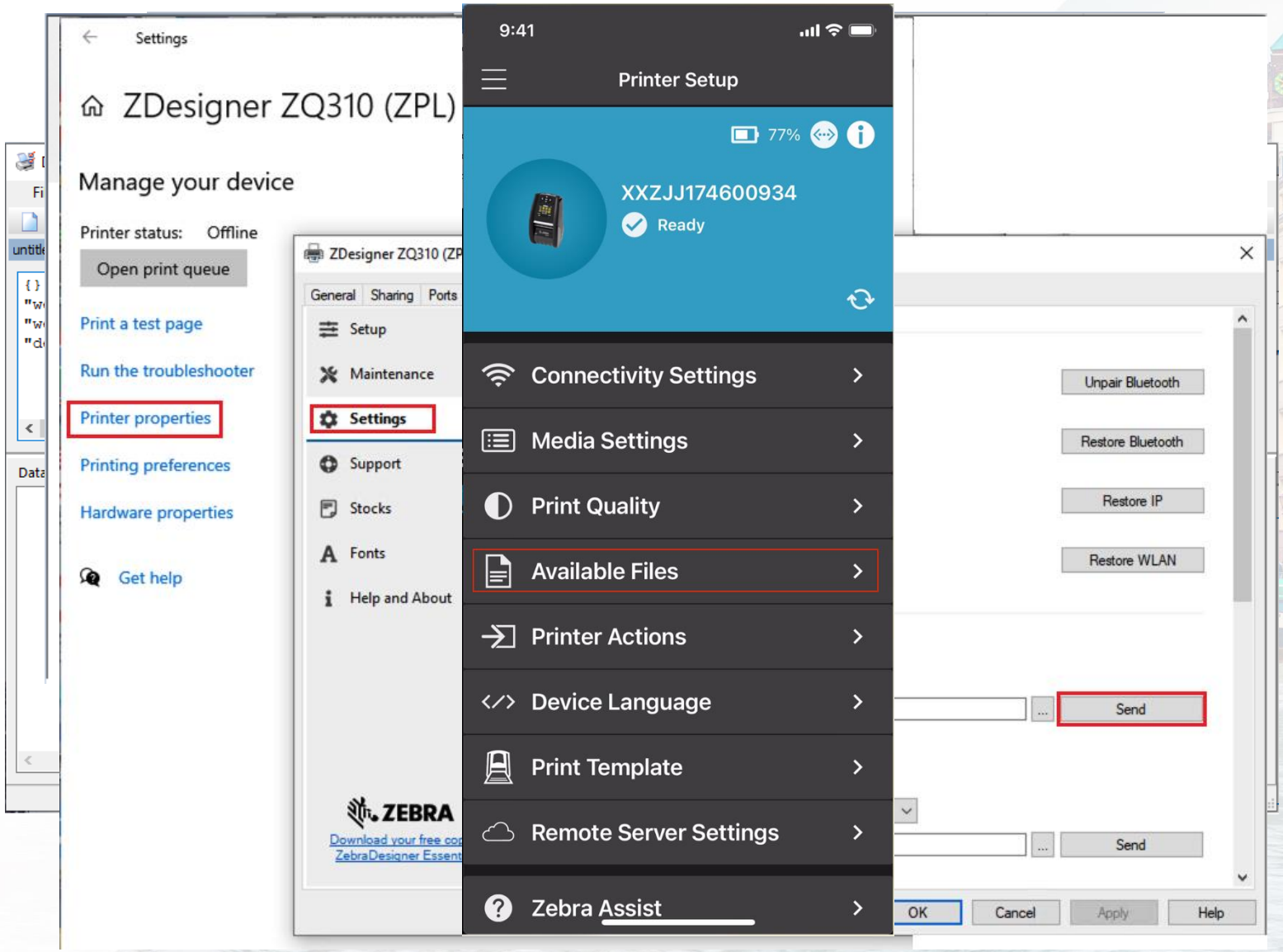


The **r** value is the **Tenant ID**

How to Enroll a Printer? – cont.

Send enrollment string to the printer

- Use the **send** or **send file** function in Printer Setup Utility for Windows
- Or, use the ZDesigner driver
- Or, use the Printer Setup Utility for Android or iOS



How to Enroll a Printer? – cont.

Verify the Weblink connection

- Retrive the Weblink log with the SGD

  `! U1 getvar "weblink"` (Provided a newline at the end)

- Watch for the following messages in the log for a successful enrollment.

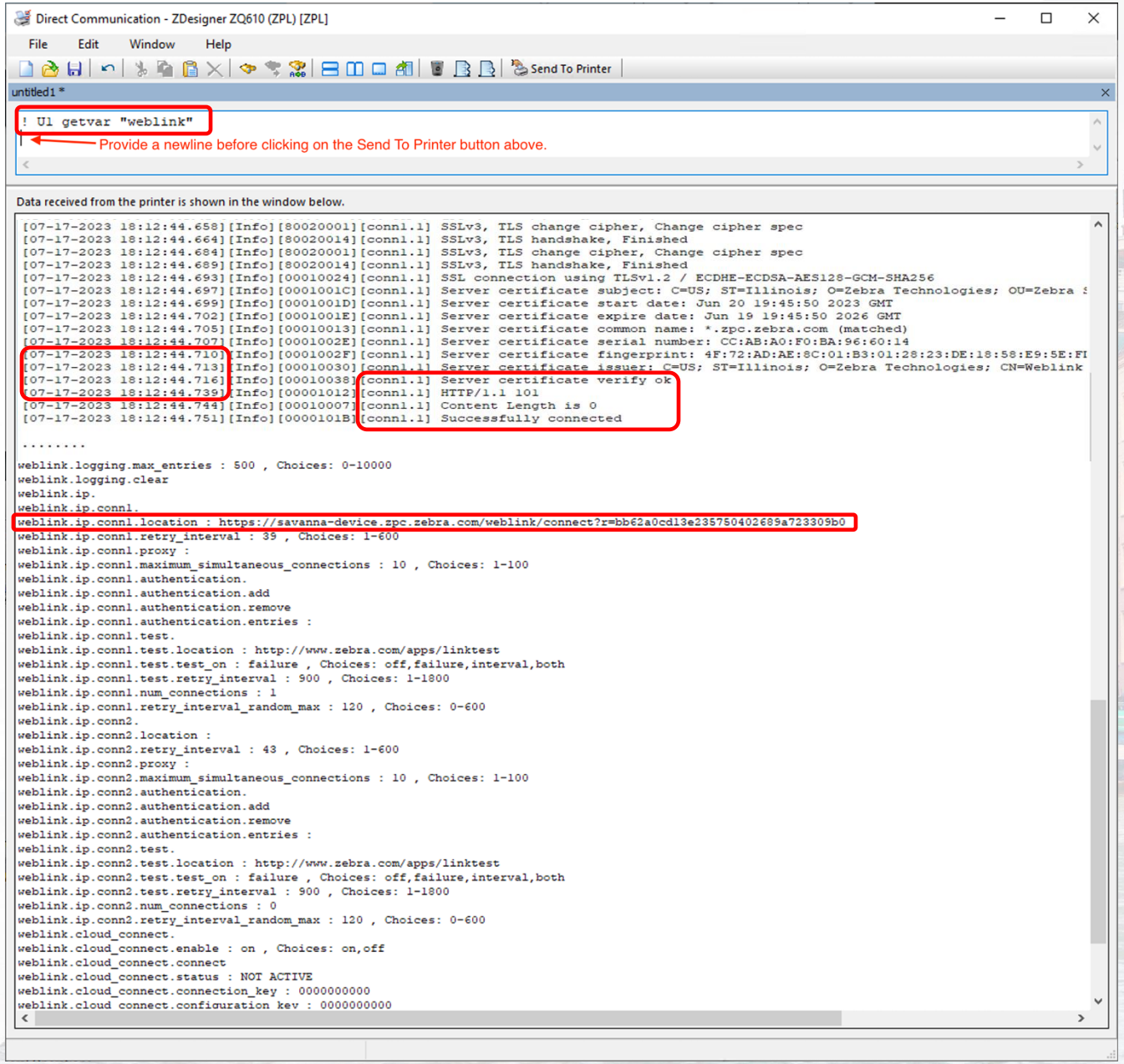
  `[conn1.nn] Successfully connected`

  or

  `[conn2.nn] Successfully connected`

If any error, check the following:

- Is there any typo in the enrollment string?
- Is there any whitespaces in the weblink URL?
- Is the data/time on the printer current?



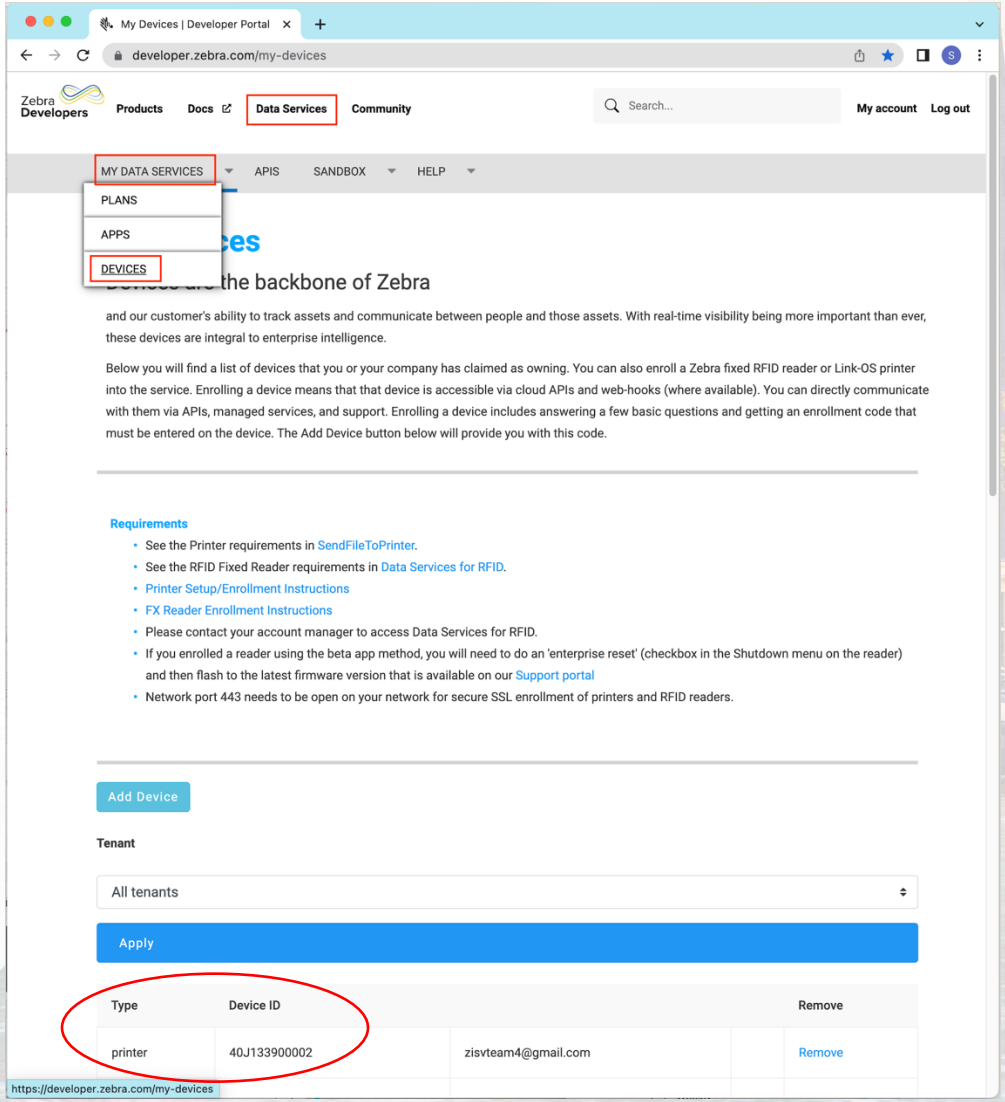
How to Enroll a Printer? – cont.

Verify the Weblink connection via the My Devices

- Click on **Data Services -> MY DATA SERVICES->DEVICES**

  Direct link: https://developer.zebra.com/my-devices

- Verify if the printer is listed



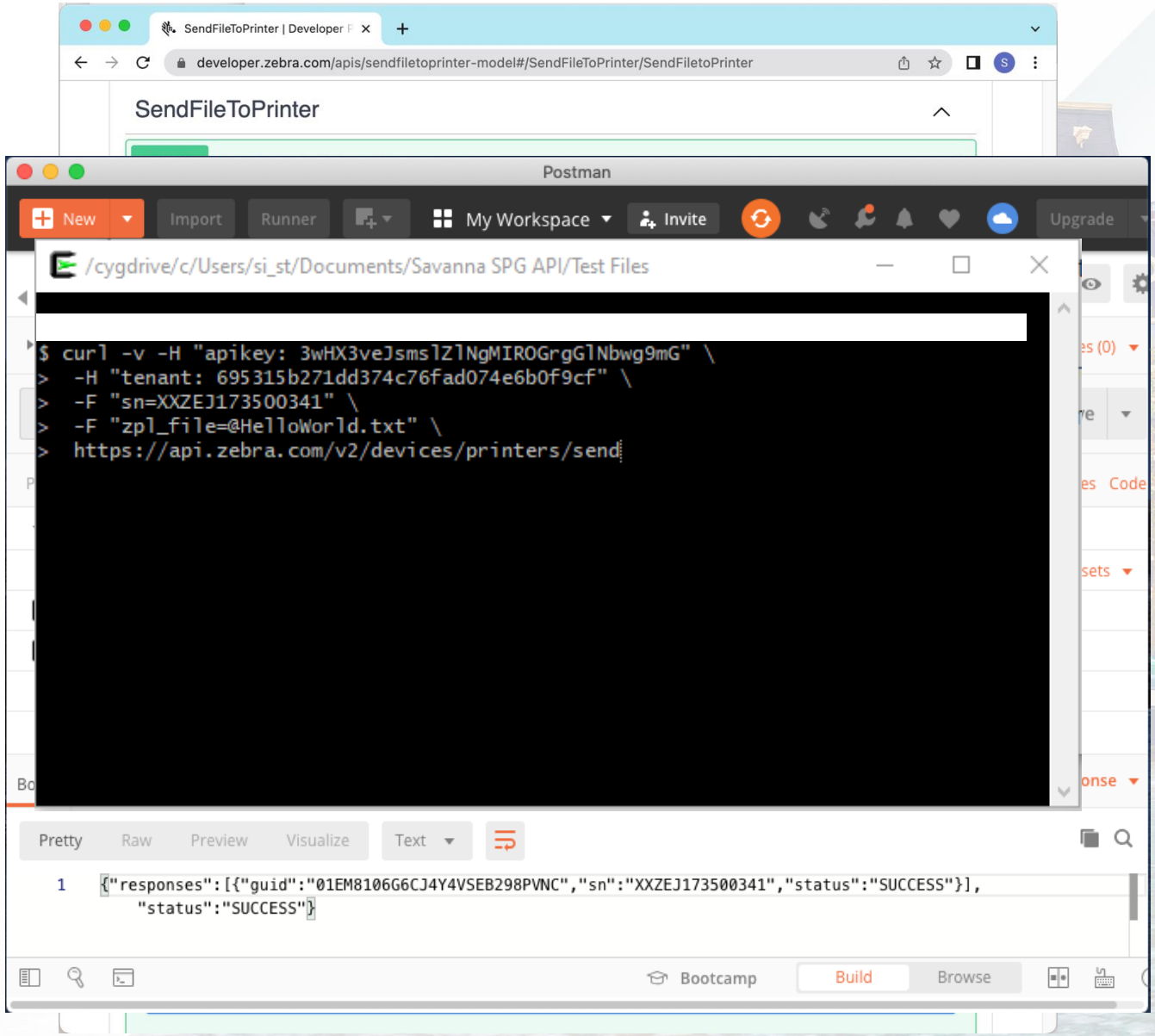
How to Use the SendFileToPrinter API?

For testing

- SendFileToPrinter API Portal

Direct Link: https://developer.zebra.com/apis/sendfiletoprinter

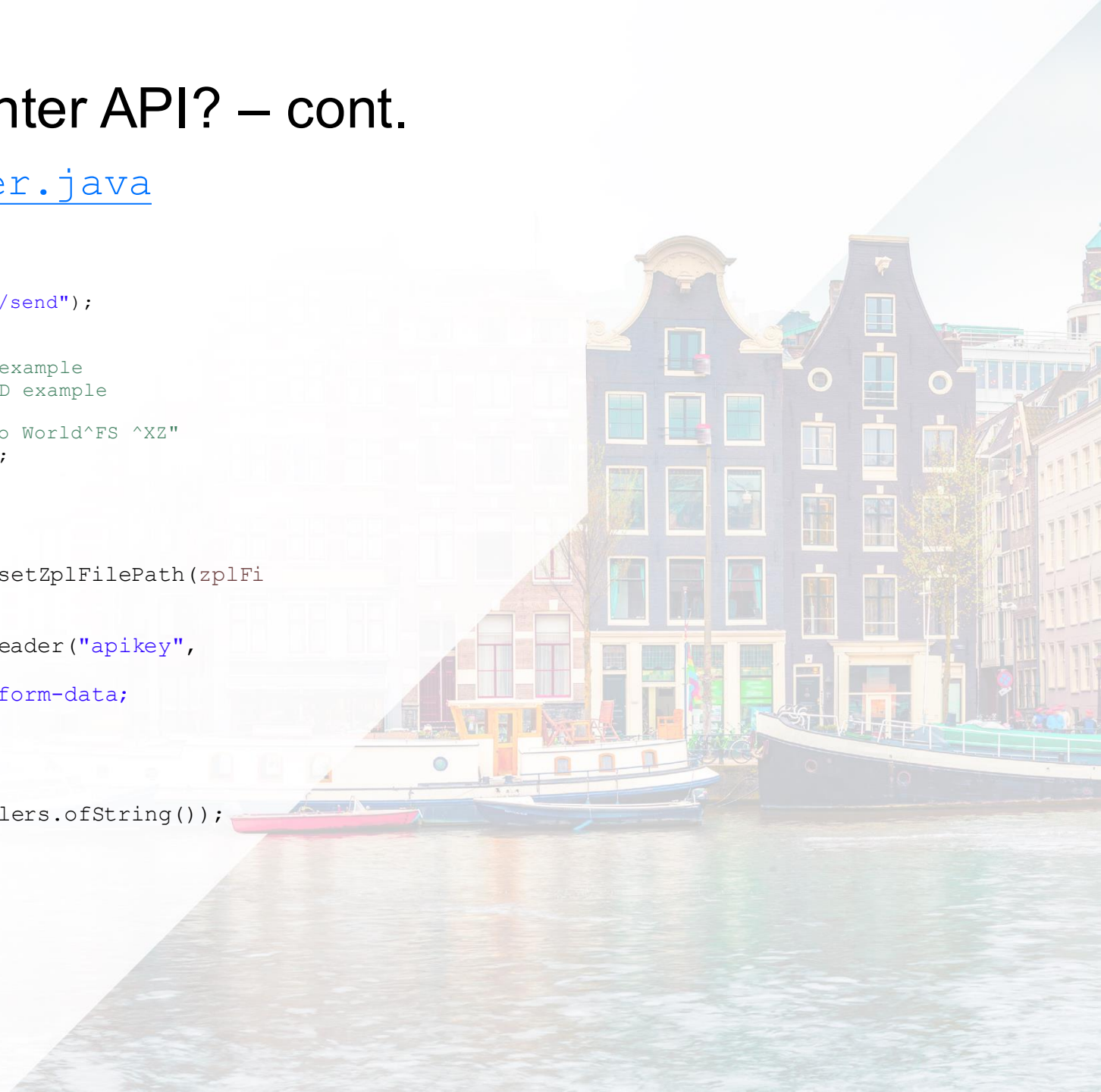
- Postman
- cURL



How to Use the SendFileToPrinter API? – cont.

Java with ZebraSftpMpBodyPublisher.java

```
// Create URI from the URL of SendFileToPrinter API
URI uri = URI.create("https://api.zebra.com/v2/devices/printers/send");

String sn = "XXZJJ174600974"; // Printer serial number example
String apikey = "EvqdePLp2WMpK8ZTqrAGDAGqCzs83Ajn"; // API Key example
String tenant = "695315b272dd374c76fad074e6b0f9cf"; // Tenant ID example

// Example ZPL file containing - "^XA ^FO50,50^ADN,36,20^FDHello World^FS ^XZ"
Path zplFilePath = Paths.get("C:\\Users\\john\\HelloWorld.txt");

// Use ZebraSftpMpBodyPublisher.java
ZebraSftpMpBodyPublisher publisher
                      = new
ZebraSftpMpBodyPublisher().addSn(sn).addSn(sn).addSn(sn).setZplFilePath(zplFi
lePath);

HttpRequest request = HttpRequest.newBuilder().uri(uri).header("apikey",
apikey).header("tenant", tenant)
                        .header("Content-Type", "multipart/form-data;
boundary=" + publisher.getBoundary())
                        .POST(publisher.build()).build();

HttpClient httpclient = HttpClient.newBuilder().build();
HttpResponse response = httpclient.send(request, BodyHandlers.ofString());

System.out.println(response.body());
```



How to Use the SendFileToPrinter API? – cont.

JavaScript with PrintFromCloud demo on GitHub

```
// Call the SendFileToPrinter API to send the file
function sendFileToPrinter(apiKey, tenant, fileToSend, serialNumbers) {

   var http = new XMLHttpRequest();
   http.open("POST", "https://api.zebra.com/v2/devices/printers/send", true);

   // Set the proper header information for the request, including the API Key.
   // Do not specify the Content-Type header here, as it is implied in
   http.setRequestHeader("apikey", apiKey); // Add API key to the header
   http.setRequestHeader("tenant", tenant); // Add tenant ID

   http.onreadystatechange = () => { // Call a function when the state changes.
       if((http.readyState == 4 || http.readyState == 1) ) {
           // alert(http.responseText);
       }
   }

   fd = new FormData();
   fd.append("zpl_file", fileToSend); // Attach the file to be sent.

   // Append the printer serial numbers
   serialNumbers.forEach(function(item, index, array) {
     fd.append("sn", item);
   })

   http.send(fd);
}
```

Resources

Documents & Demo

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- Use the SendFileToPrinter API for Your Cloud-Based Printing Needs (https://developer.zebra.com/blog/use-sendfiletoprinter-api-your-cloud-based-printing-needs)
- Getting Started with Zebra Data Services (https://developer.zebra.com/docs/getting-started)
- Printer Setup Guide (https://developer.zebra.com/docs/printer-setup-sendfiletoprinter)
- Print from cloud example in JavaScript on GitHub – PrintFromCloud (https://github.com/ZebraDevs/Zebra-Printer-Samples/tree/Print-From-Zebra-Data-Services-Cloud-Example)

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Printer Profile Manager Enterprise (PPME) Cloud Edition

Part of Zebra Print DNA

Zebra Print DNA™

Your Printer's Build-In Advantage

ZEBRA

Zebra Print DNA™

Your Printer's Built In Advantage

Print DNA is a suite of built-in software applications, utilities and tools that deliver unmatched experiences for every kind of user and provide the ability to optimize printers' performance over their entire lifecycle, even as business needs evolve.

www.zebra.com/printdna

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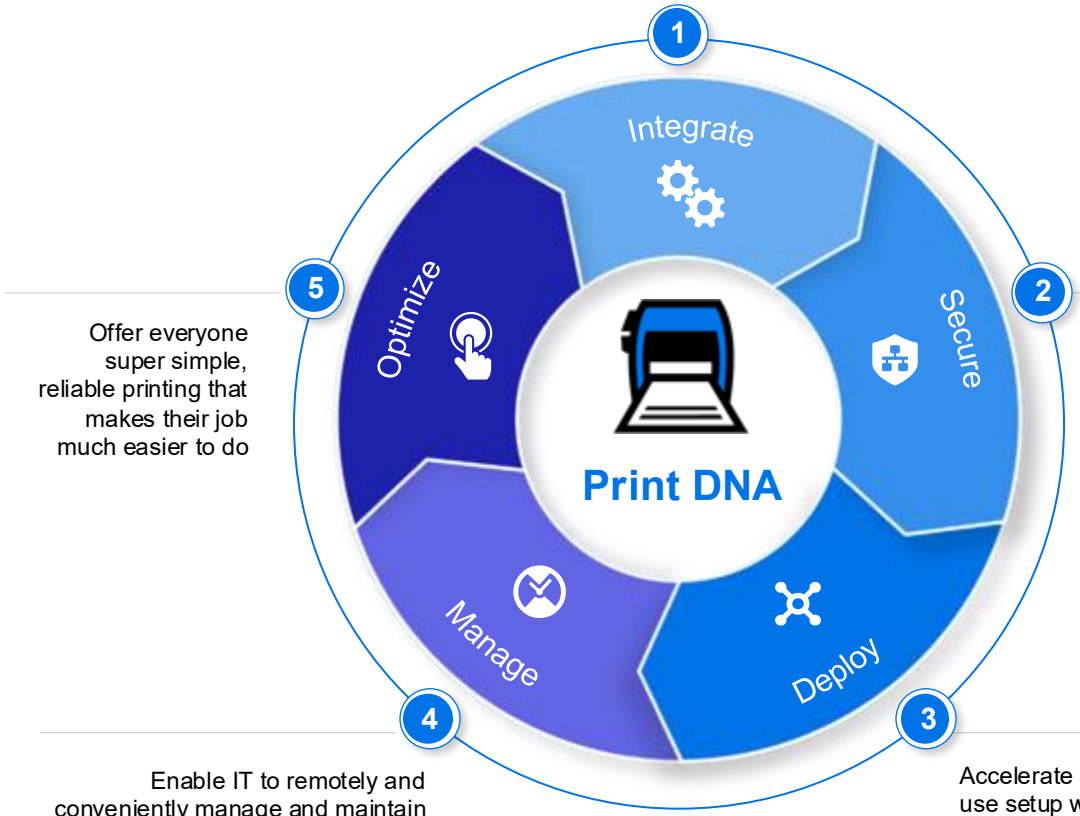

Effortlessly customize and integrate print apps for multiple environments and infrastructures

Give IT the ability to uncover potential printer security vulnerabilities and defend against cyber attacks

Accelerate rollouts with an easy-to-use setup wizard, remote access and streamlined steps

Enable IT to remotely and conveniently manage and maintain printers anywhere, anytime

Offer everyone super simple, reliable printing that makes their job much easier to do

Get It Done the Easy Way

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Zebra hosted solution

Exceeds the On-Premise 10K printer limit

Simple Printer Setup

Built-In Security

Printer Profiles

Automation Tools

Real-Time Status Alerts

Printer Profile Manager Enterprise in Action

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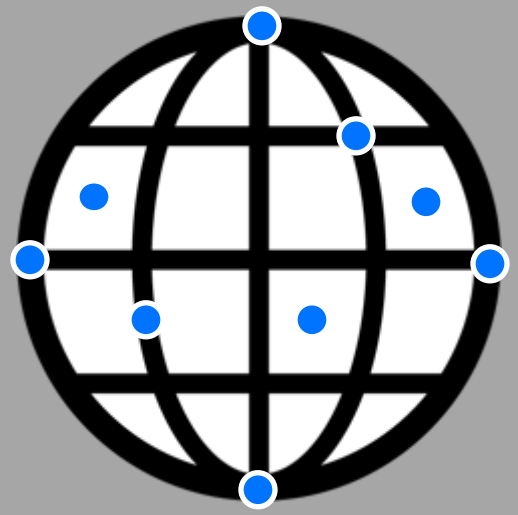

Access your Print DNA printers anywhere on your global network

Easy Printer Grouping

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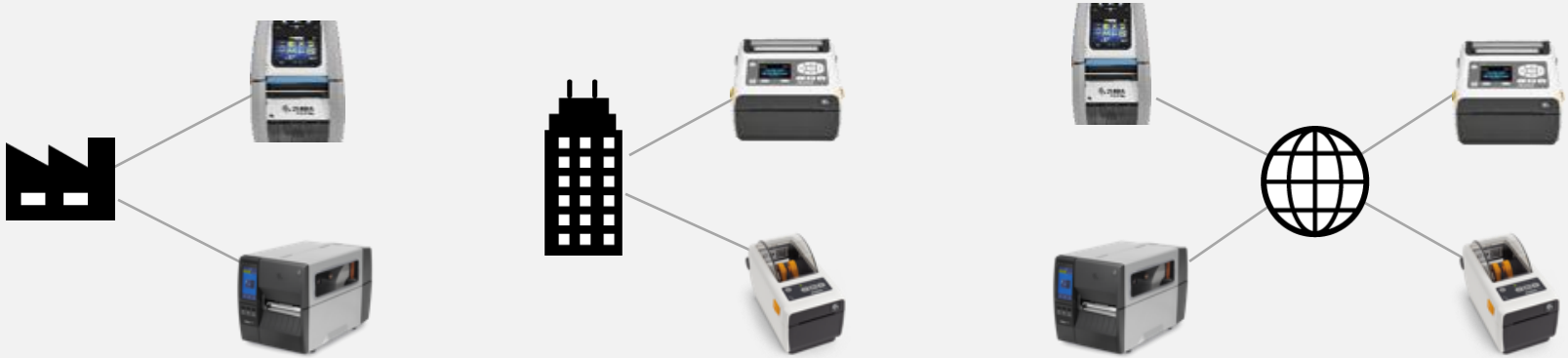
Printer Profile Manager Enterprise Is Your “Eye in The Sky”

Printers can be connected and managed from wherever they are around the globe



“Tags” Let You Organize Your Printers Into Groups

Group/filter printers by “Tags” to make it simple to see just the units you need

Shipping

Receiving

Returns

Simple Printer Setup

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Profile Manager Enterprise Makes Setup “Click Simple”

Quickly find what you need with 300+ settings, organized by category

- Tools
- WLAN
- Ports
- Sensors
- Bluetooth
- RFID
- Network
- Power
- Objects

Use Resources Folder to Store Objects

Distribute content to one or many printers by Tag, simplifying multi-printer control

Printer Profiles

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Store Multiple Printer Profiles

Printer profiles contain all the settings and objects that define a printer's configuration

Send Profiles to Printer Groups Using Tags

Distribute content to one or many printers by Tag, simplifying managing many printers

Automation

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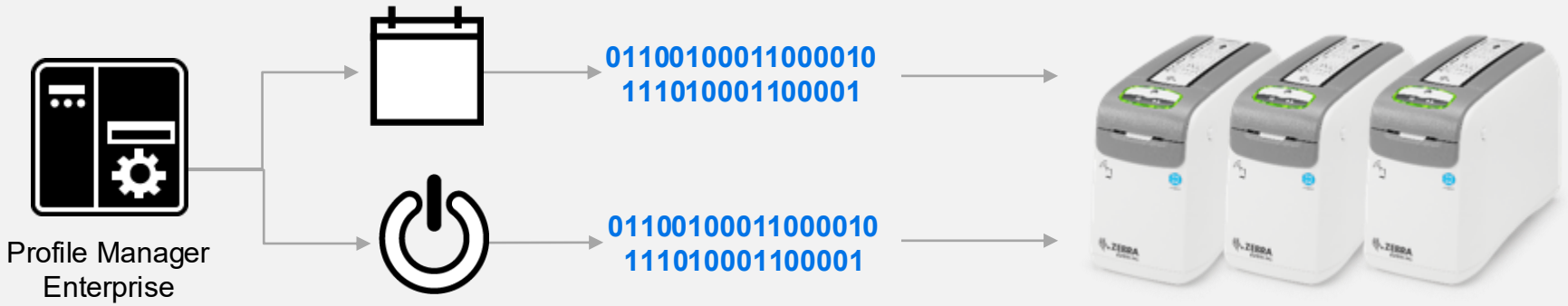
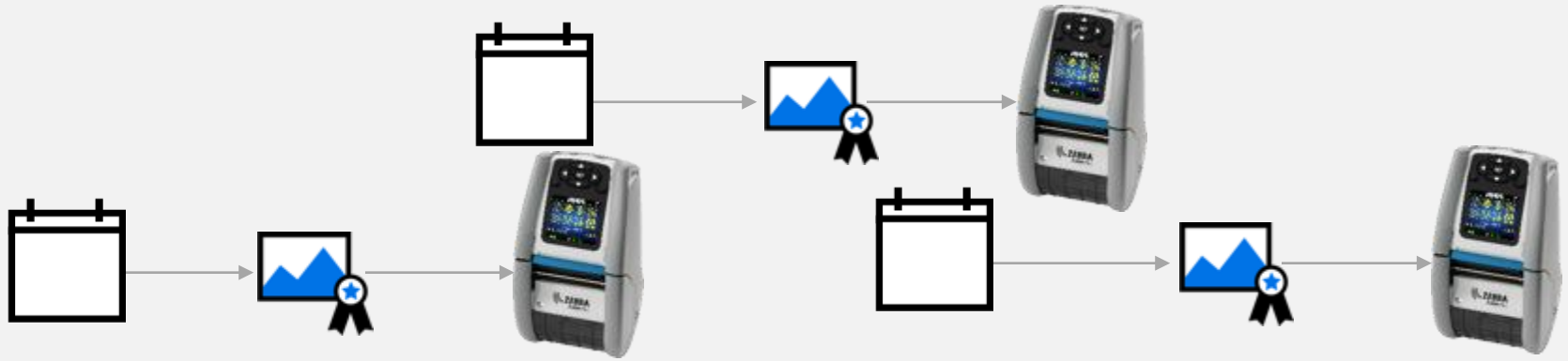
Schedule Printer Updates

Schedule updates by time, date or printer power-up with the “Provisioning” feature



Automate Printer Updates

Automate sending Profiles or Resources outside of worker shifts.



Automation

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Real-Time Alerts

Quickly triage issues and get printers back to work with real-time alerts

Filter Views Based on Status

Use multiple filters including Status and Tags to simplify managing large printer fleets

Management Console

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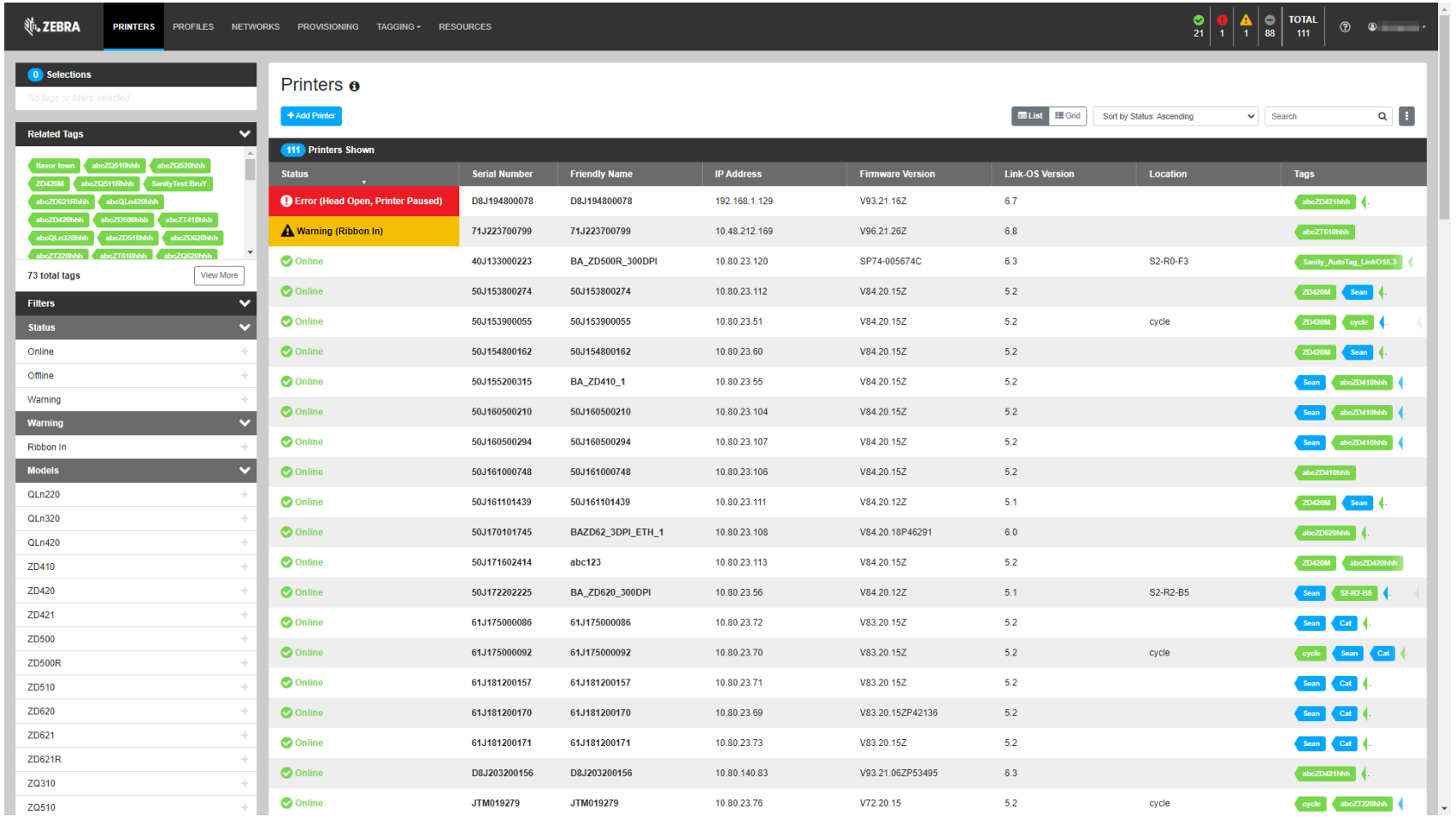
Manage all your printers from a user-friendly dashboard



Management Console

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Purchase a subscription based on how many printers you have now, and add more as your business grows

Part Number	Description	Terms
SW-PMCLOUD-TRIAL	60-Day Trial of Zebra Printer Management Cloud	60-day trial
SW-PMCLOUD-1YR	1-Year Subscription for 1 Printer for Zebra Printer Management Cloud	1-year subscription
SW-PMCLOUD-1YR-R	1-Year Renewal Subscription for 1 Printer for Zebra Printer Management Cloud	1-year subscription renewal

The SW-PMCLOUD-1YR part number should be ordered in quantities according to the tier quantities below.

Tier Quantities:
100, 250, 500, 1000, 1500, 2500, 3500, 5000, 6500, 8000.
For quantities beyond 8000, or a deviation from this tier structure, contact Zebra ATS Product Management.

Questions?

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Thank You