

XFS4IoT SP-Dev Workgroup

1 June 2021

To add others from your company



Please email us at:

xfs4iot_sp-dev_info@kal.com

- Ideas for contributions:
 - New SPs using the framework
 - SP simulators using the framework
 - Test scripts, test harnesses, etc. for SP testing
 - Sample code for new XFS4 applications
 - GitHub “pull requests” for changes to the SP-Dev code

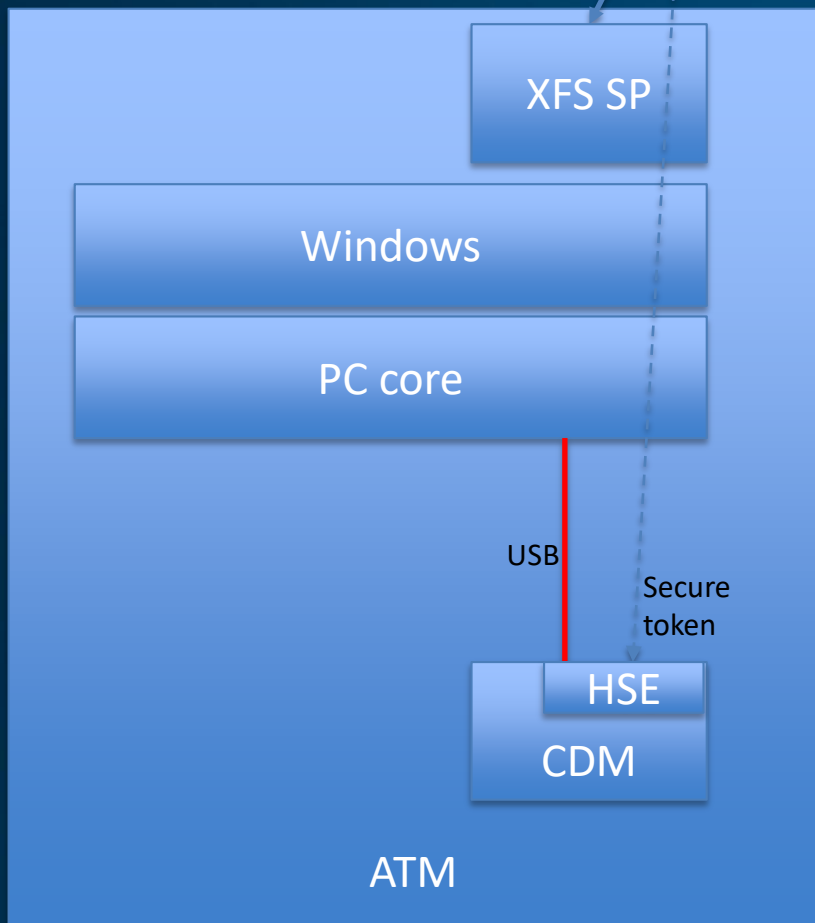
- The first SP-Dev framework was made **available** on GitHub on 4 May 2021:
 - Card reader class
- *Members can create a GitHub fork and start developing card reader SPs*

- The Card Reader framework looks after all the XFS specific details:
 - Processing commands
 - Sending command responses
 - Sending events
- The SP developer only needs to focus on the device specific interface

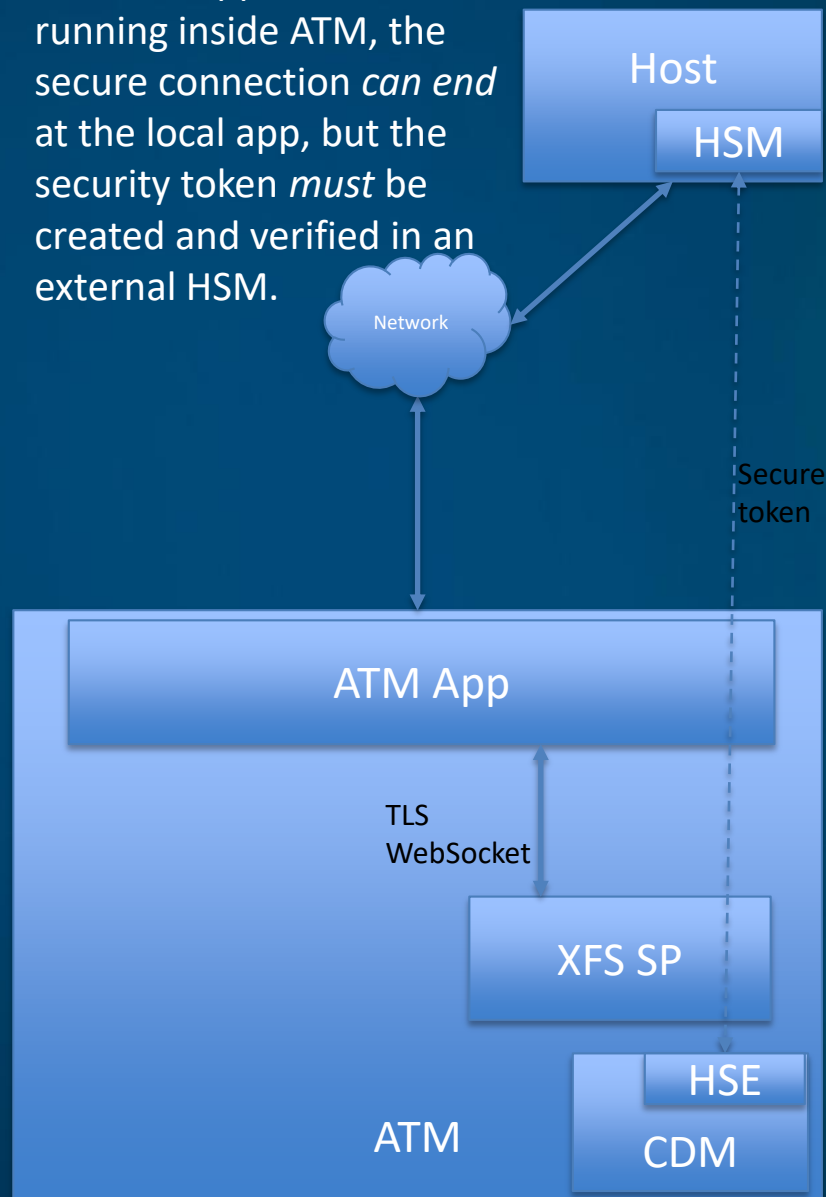
- The second SP-Dev framework is targeted to be **available** on GitHub 6 July 2021:
 - Cash Dispenser class
- The initial release will not include:
 - End-to-end security
 - Cash recycling

XFS4 Security – implementation issues to consider

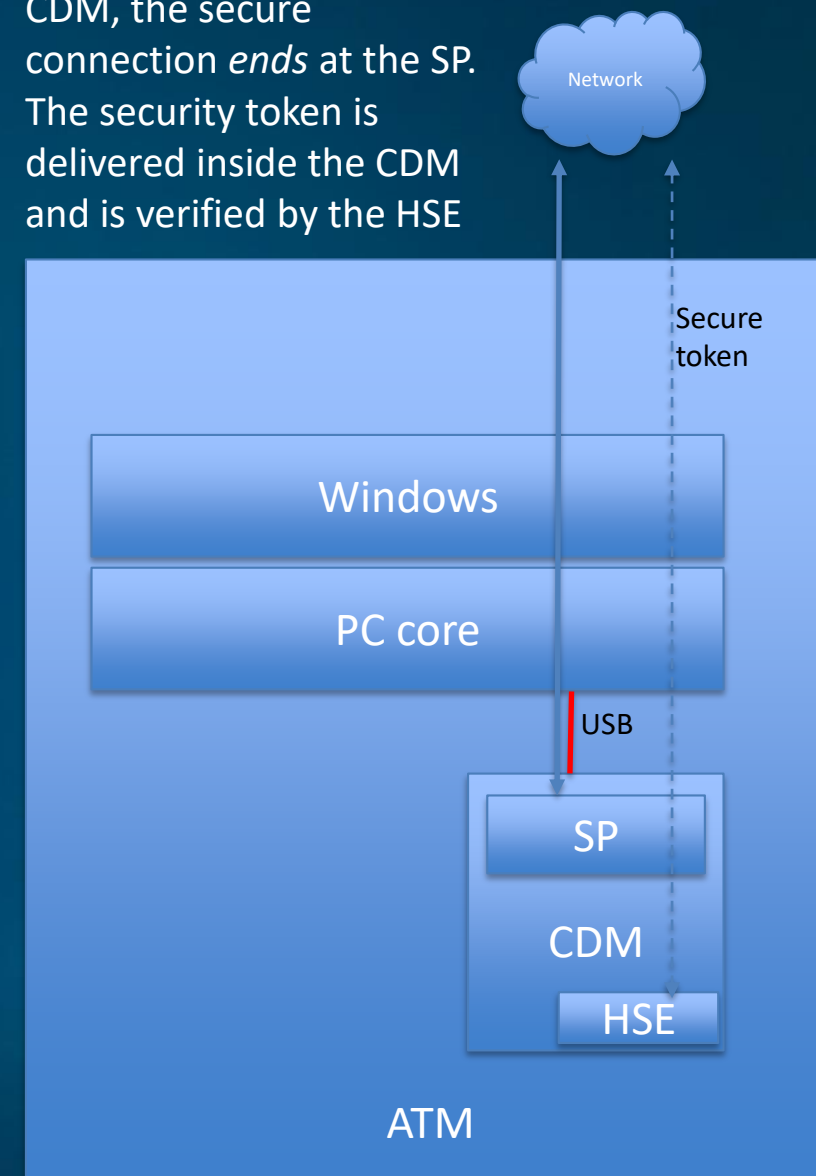
A traditional architecture with an XFS SP running in Windows 10, the secure connection *can end* at the SP but the security token *must* be created / verified inside the CDM.



With the application running inside ATM, the secure connection *can end* at the local app, but the security token *must* be created and verified in an external HSM.



When the SP is inside the CDM, the secure connection *ends* at the SP. The security token is delivered inside the CDM and is verified by the HSE



NuGet Packages and how to use them

- Package Manager for .NET
- Enable developers to share reusable code
- Free and open-source
- Developed by Microsoft
- Tools to create, publish and consume packages in Visual Studio

- Compressed Zip file – extension “.nupkg”
- Contains:
 - Compiled code/assemblies,
 - Other files related to that code,
 - A descriptive manifest that includes information like author, licence or version number
- No need to download, fork or copy the framework source code
- Reference NuGet packages in SP solution

Where to get NuGet packages for the framework?



- On GitHub as **Pre-release**

"v0.0.1" = framework version

"-alpha.x" = *Pre-release* version "x"

The screenshot shows the GitHub repository page for KAL-ATM-Software / KAL_XFS4IoT_SP-Dev. The 'Releases' tab is selected, displaying two pre-release versions:

- v0.0.1-alpha.2** (Pre-release)
 - Commit: 587e535
 - Released: 5 minutes ago by github-actions
 - Changelog:
 - Added support for NuGet packages
 - Moved sample code to KAL_XFS4IoT_SP-Dev-Samples repo
 - Updated RequestId to be integer value
 - Added message queuing support
 - Updated message classes
 - Assets: 7
- v0.0.1-alpha.1** (Pre-release)
 - Commit: 679364b
 - Released: 3 days ago by github-actions
 - Changelog:
 - Update package details
 - Assets: 7

Where to get NuGet packages for the framework?








- Publicly available on *nuget.org*

nuget.org/packages?q=xf4

nuget Packages Upload Statistics Documentation Downloads Blog

xf4

5 packages returned for xf4

-  [KAL.XFS4IoT.SP-Dev.Framework.Common](#) by: KAL-ATM-Software
↓ 0 total downloads ⌚ last updated 4 hours ago 📦 Latest version: 0.0.1-alpha.1
KAL.XFS4IoT.SP-Dev.Framework.Common Pre-Release
-  [KAL.XFS4IoT.SP-Dev.Framework.Server](#) by: KAL-ATM-Software
↓ 0 total downloads ⌚ last updated 4 hours ago 📦 Latest version: 0.0.1-alpha.1
KAL.XFS4IoT.SP-Dev.Framework.Server Pre-Release
-  [KAL.XFS4IoT.SP-Dev.Framework.ServiceInterfaces](#) by: KAL-ATM-Software
↓ 0 total downloads ⌚ last updated 4 hours ago 📦 Latest version: 0.0.1-alpha.1
KAL.XFS4IoT.SP-Dev.Framework.ServiceInterfaces Pre-Release
-  [KAL.XFS4IoT.SP-Dev.Framework.Core](#) by: KAL-ATM-Software
↓ 0 total downloads ⌚ last updated 4 hours ago 📦 Latest version: 0.0.1-alpha.1
KAL.XFS4IoT.SP-Dev.Framework.Core Pre-Release
-  [KAL.XFS4IoT.SP-Dev.Framework.CardReader](#) by: KAL-ATM-Software
↓ 0 total downloads ⌚ last updated 4 hours ago 📦 Latest version: 0.0.1-alpha.1
KAL.XFS4IoT.SP-Dev.Framework.CardReader Pre-Release

Where to get NuGet packages for the framework?



- Accessible directly from Visual Studio via NuGet Package Manager

NuGet Package Manager: SampleCardReader

Package source: **nuget.org**

KAL.XFS4IoT.SP-Dev.Framework.Server by XFS4IoT.SP.Framework.Server, 38 downloads v0.0.1-**alpha.2**
KAL.XFS4IoT.SP-Dev.Framework.Server Pre-Release

KAL.XFS4IoT.SP-Dev.Framework.CardReader by XFS4IoT.SP.Framework.CardReader, 37 downloads v0.0.1-alpha.2
KAL.XFS4IoT.SP-Dev.Framework.CardReader Pre-Release

KAL.XFS4IoT.SP-Dev.Framework.Common by XFS4IoT.SP.Framework.Common, 37 downloads v0.0.1-alpha.2
KAL.XFS4IoT.SP-Dev.Framework.Common Pre-Release

KAL.XFS4IoT.SP-Dev.Framework.Core by XFS4IoT.SP.Framework.Core, 37 downloads v0.0.1-alpha.2
KAL.XFS4IoT.SP-Dev.Framework.Core Pre-Release

KAL.XFS4IoT.SP-Dev.Framework.ServiceInterfaces by XFS4IoT.SP.Framework.ServiceInterfaces, 35 download v0.0.1-alpha.2
KAL.XFS4IoT.SP-Dev.Framework.ServiceInterfaces Pre-Release

KAL.XFS4IoT.SP-Dev.Framework.Server v0.0.1-alpha.2

Version: **Latest prerelease** 0.0.1-alpha.2 **Install**

Options

Description

KAL.XFS4IoT.SP-Dev.Framework.Server Pre-Release

Version: 0.0.1-alpha.2

Author(s): XFS4IoT.SP.Framework.Server

License: MIT

Date published: Monday, May 31, 2021 (5/31/2021)

Report Abuse: <https://www.nuget.org/packages/KAL.XFS4IoT.SP-Dev.Framework.Server/0.0.1-alpha.2/ReportAbuse>

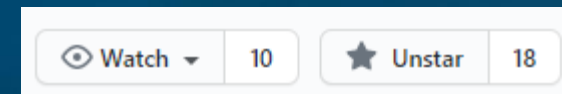
Dependencies

- net5.0
- KAL.XFS4IoT.SP-Dev.Framework.Core (>= 0.0.1-alpha.2)

Sample code on GitHub

- New "[KAL XFS4IoT SP-Dev-Samples](#)" repo
- Contains only samples solutions
- Separated from the framework
- Only what is needed to write an SP
- References framework via NuGet packages for C# SPs

Currently working on C++ card reader sample...



Dedicated Samples repo



- New repo
- Building instructions available

KAL-ATM-Software / KAL_XFS4IoT_SP-Dev-Samples

<> Code ⓘ Issues 🔗 Pull requests ⚙️ Actions 📁 Projects 📖 Wiki 🛡️ Security 📈 Insights ⚙️ Settings

main 1 branch 0 tags

Go to file Add file Code

RossK-KAL Add Samples and TestClients ba249c1 2 minutes ago 1 commit

ClientTestApp	Add Samples and TestClients	2 minutes ago
Devices	Add Samples and TestClients	2 minutes ago
.gitignore	Add Samples and TestClients	2 minutes ago
LICENSE.md	Add Samples and TestClients	2 minutes ago
README.md	Add Samples and TestClients	2 minutes ago

README.md

KAL_XFS4IoT_SP-Dev-Samples

KAL's XFS4IoT SP-Dev is an open source implementation of the revolutionary new XFS version 4 global standard. It is ready for the IoT era and paves the way for a cloud-based, secure, OS-agnostic ATM industry.

This repo contains sample code written using the KAL XFS4IoT SP-Dev Framework available here:
https://github.com/KAL-ATM-Software/KAL_XFS4IoT_SP-Dev

Find out more about this exciting new project and how you can get involved in shaping the ground-breaking XFS4IoT SP-Dev framework by contacting us @ xfs4iot_sp-dev_info@kal.com

Building the sample simulator

1. Clone KAL_XFS4IoT_SP-Dev-Samples repository from https://github.com/KAL-ATM-Software/KAL_XFS4IoT_SP-Dev-Samples.

SP-Dev XFS4IoT customisation

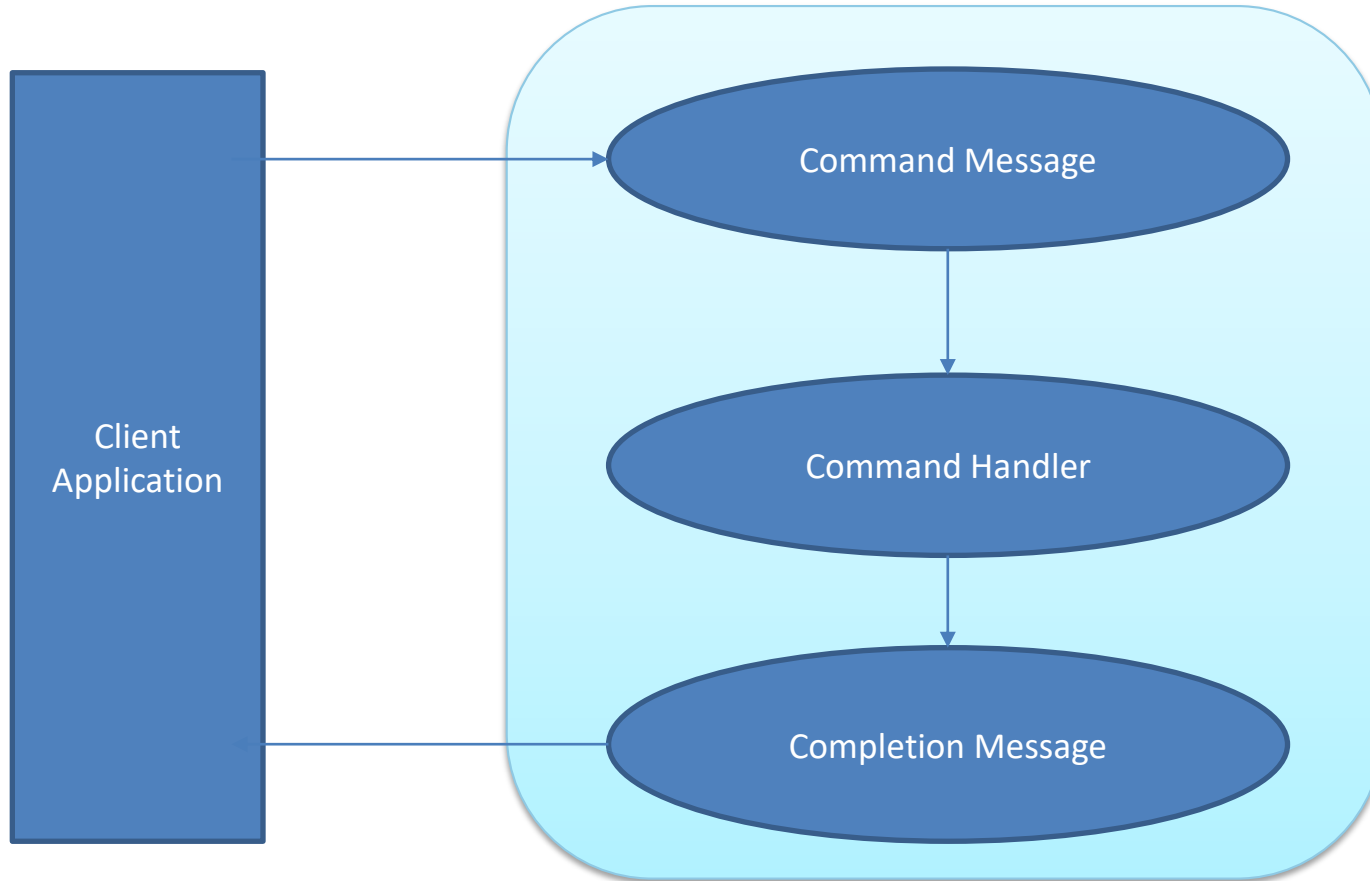
Adding custom behaviour to the SP-Dev Framework

- XFS3.x – limited support for extensions
- XFS4IoT – based on JSON and much more flexible
- XFS4IoT messages and commands can be customised as long as:
 - There are no breaking changes or incompatibilities
 - There are no 'collisions' between different vendors

- Two options for customisation:
 1. Custom parameters on existing JSON messages
 2. Complete new messages for commands, events and completions
- Simple rules:
 - Service must not *require* any extensions
 - Service and application must *ignore* anything they don't know
 - Extensions must use per-vendor prefix

How to customise the SP-Dev framework:

- Custom message parameters:
 - Fork and change
- Custom Commands
 - Add command message classes and handlers. Can be done in a customisation assembly



- JSON command message
- Command message object
- Command handler
- Completion message object
- Completion JSON



ATM Software

Demo

Demo : Adding a new property



- Fork the source code
- Edit ReadRawData_g.cs in the Core project and add a new property

```
namespace XFS4IoT.CardReader.Completions
{
    [DataContract]
    [Completion(Name = "CardReader.ReadRawData")]
    73 references | Kit Patterson, 1 day ago | 2 authors, 4 changes
    public sealed class ReadRawDataCompletion : Completion<ReadRawDataComp
    {
        2 references | Kader Baadoud, 70 days ago | 1 author, 1 change
        public ReadRawDataCompletion(string RequestId, ReadRawDataCompleti

        [DataContract]
        68 references | Kit Patterson, 1 day ago | 2 authors, 4 changes
        public sealed class PayloadData : MessagePayload
        {
            [DataMember(Name = "KALErrorText")]
            0 references | 0 changes | 0 authors, 0 changes
            public string KALErrorText { get; set; }
        }
    }
}
```

Demo : Adding a new property



- Set the new value in the handler class – e.g. ReadRawDataHandler.cs in CardReaderServiceProvider

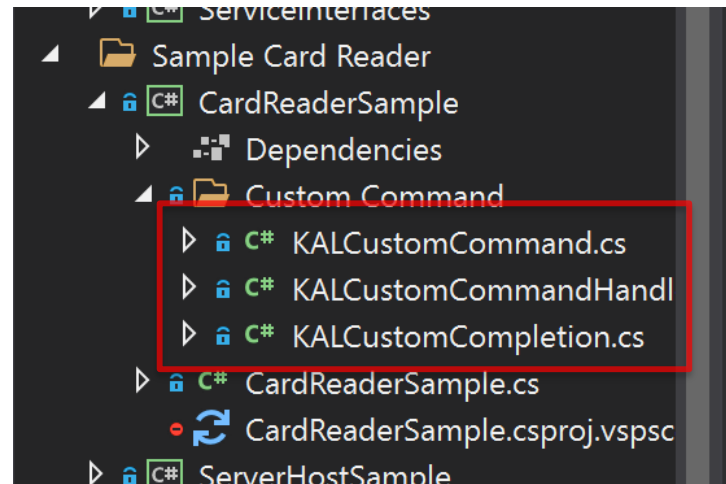
```
ReadRawDataCompletion.PayloadData payloadData = new ReadRawDataC
    readCar
    readCar
    track1,
    track2,
    track3,
    chip,
    securit
    waterma
    memoryC
    track1F
    frontIm
    backIma
    track1J
    track3J
    ddi);

    payloadData.KALErrorText = "Useful Error Text";
    return payloadData;
}
```


- ```
0: Doing accept card
0: ReadRawDataCommand
0: Waiting for response...
0: MediaInsertedEvent : {"payload":{}, "headers":{"name":"CardReader.Inse
-9442-188e6181cbdb", "type":"event"}}
0: MediaInsertedEvent : {"payload":{}, "headers":{"name":"CardReader.Medi
066-9442-188e6181cbdb", "type":"event"}}
0: ReadRawDataCompletion : {"payload":{"kalErrorText":"Useful Error Text
c40TAXmJm0NTZeU01JVEgvSk9ITi5NUL4wMjA5NDU4NTIzMDEyMDA1ODR4MDA1NjgwMDAwMD
DN...FMD...M01N...M15NDU4NTIzMDEyMDA1ODR4MDA1NjgwMDAwMD...
```

# Demo : Adding a custom command

- Three new classes are needed – the command message, the handler, and the completion message
- Include the relevant attributes on each class



```
[DataContract]
[Command(Name = "CardReader.KALCustomerCommand")]
8 references | Kit Patterson, 22 hours ago | 1 author, 1 change
public class KALCustomCommand : Command<KALCustomCommand.PayloadData>
{
 [DataContract]
 5 references | Kit Patterson, 22 hours ago | 1 author, 1 change
 public class PayloadData : XFS4IoT.Commands.MessagePayload
 {
 }
}
```

```
[CommandHandler(XFS4IoT.XFSConstants.ServiceClass.CardReader, typeof(KALCustomCommandHandler))]
1 reference | Kit Patterson, 22 hours ago | 1 author, 1 change
public class KALCustomCommandHandler : ICommandHandler
{
 private readonly ICommandDispatcher SP;
 private readonly ILogger logger;

 0 references | Kit Patterson, 22 hours ago | 1 author, 1 change
 public KALCustomCommandHandler(ICommandDispatcher SP, ILogger logger)
 {
 }
}
```

- The classes can be copied and customised from the existing projects
- The commands then work like any other commands

```
5728924): KALCustomCommand
5812862): KALCustomCompletion : {"payload":{"resultInfo":"This is the result"},"headers":{"
omCompletion","requestId":"f039db96-4179-4519-843f-225cd46b4bae","type":"completion"}}
5822474): Done
```

- Extending XFS4IoT is possible and supported
- Extensions with the KAL SP-Dev Framework are simple
- But don't break things!

# Small devices and low bandwidth IoT connections

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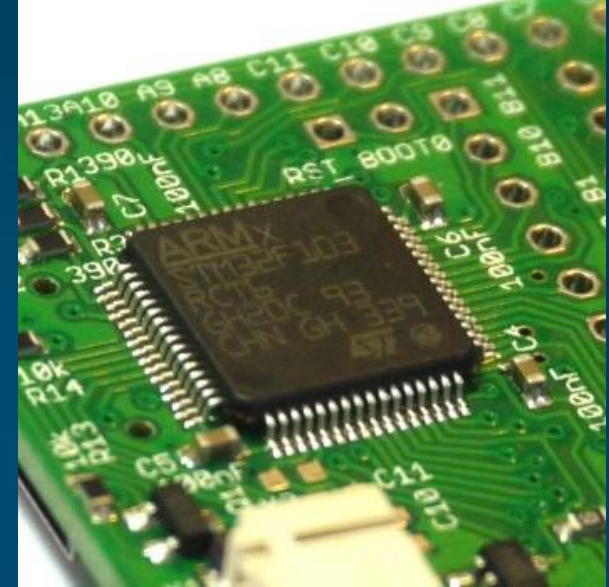
Our vision:

- **Constrained devices**

How small can we go?

- **Alternative networks**

Untether from traditional infrastructure, get ATMs out in the real world



Possible .NET implementations for MCUs:

- nanoFramework

But, our XFS4IoT SP Dev framework:

- Is not currently compatible with nanoFramework
- Uses a lot of resources for an MCU



## Alternative Network Connections

- LoRaWAN
- LTE
- More?





- What is LoRaWAN?
- Why it matters?



Issues:

- Bandwidth
- Reliability

## MS Teams

- We are changing to monthly calls
- First Tuesday of each month at 1300 UK time

Next call: **6<sup>th</sup> July 2021**, 1300 UK, 0800 US EST, 2100 Tokyo time