



# Namespaces, Security, and Addressing

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Based on work with the Piccolo Project within Celtic-Next



# Background to Paper

## Rise of container based modularisation of applications

**Containerisation simultaneously meets many different requirements including**

- > Code development (especially to the 'agile agenda')
- > Service abstraction
- > Heterogeneity of development/runtime environments
- > Integration (eg the modules of a CI/CD pipeline)
- > Distribution
- > Interaction with networking

**Strong case that one solution satisfying all these requirements is a good thing**

- > But does one size really work for all?

## Potential Issues

**Logical distribution with in datacentre -> physical distribution**

- > Edge compute places more constraints than a reasonably homogeneous datacentre infrastructure

**Scale of service abstraction is fixed**

- > Ideally service abstraction should be flexible and recursive

**Scale of service abstraction is linked to networking and implementation**

- > Small modules = flexible implementation but many networking interfaces
- > Large modules = small number of networking interfaces but inflexible implementation

**"Sidecars" and "proxies" are heavyweight in highly distributed environments**

- > These link application namespace to network addressing

## Two interesting use cases

### **Distributed video processing**

**Many video applications involve feature extraction and other processing, often based in ML algorithms**

#### **Processing at the camera**

- > Increases the cost of the camera
- > Make changing the processing algorithms complex

#### **Processing in the cloud**

- > requires transport of full video bandwidth
- > Makes full video stream available to unintended cross-correlations with associated privacy concerns

#### **Processing at the edge**

- > Potentially the best of both

### **Automated production facility (smart factory)**

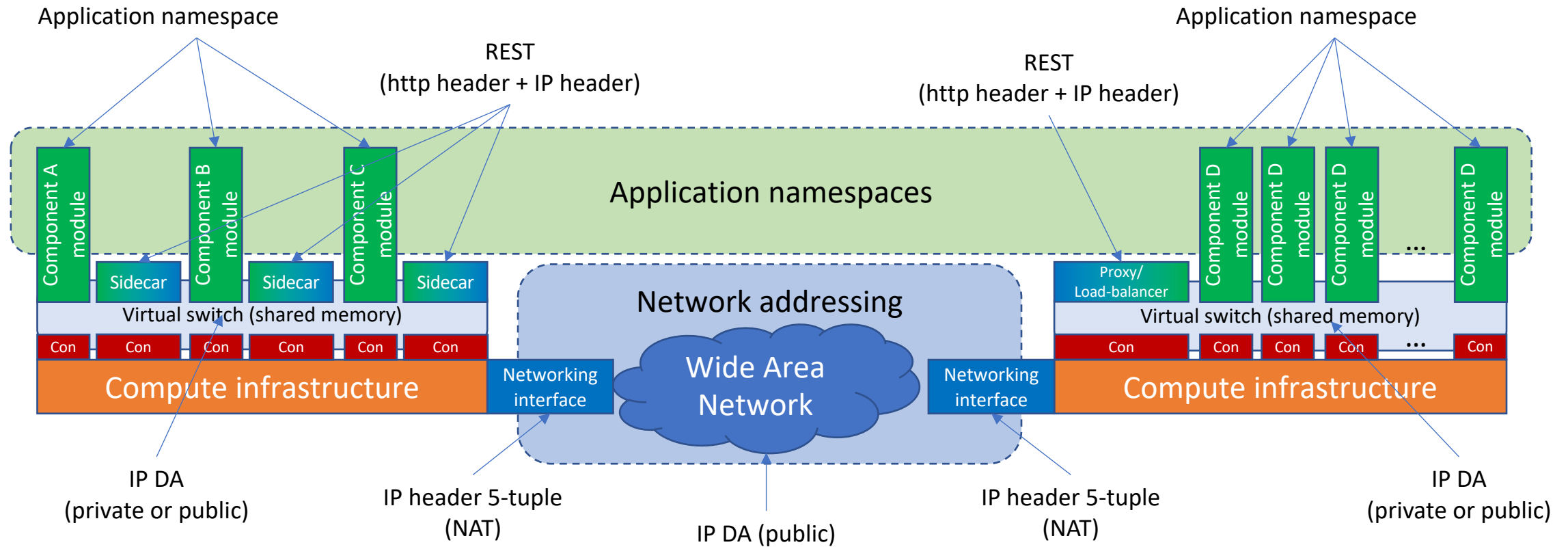
**The scale and scope of production automation is becoming more like a networked distributed application**

**Very different background and legacy standards**

**Greater scale and scope leading to need for modularity in automation design**

**Time to re-programme the automation facility to different production applications becoming a key concern**

# Namespaces and Addressing



# Three areas to be explored

## **Bringing the compiler and orchestrator closer together**

- > Potentially enables flexible and recursive service abstraction without compromising runtime efficiency
- > Avoids “sidecars” and “proxies”

## **Defining layering but what is rather than what should be**

- > A robust common framework between application and network for service abstraction and transparency

## **Primacy of private networking and addressing**

- > Future Internet addressing should be based on extensible/contextualisable local addressing in the same way application namespaces work
- > Facilitates linkage and can give a basis for security
- > This is ‘de facto’ largely the case already