

A Virtual SDN-Enabled EPC Architecture

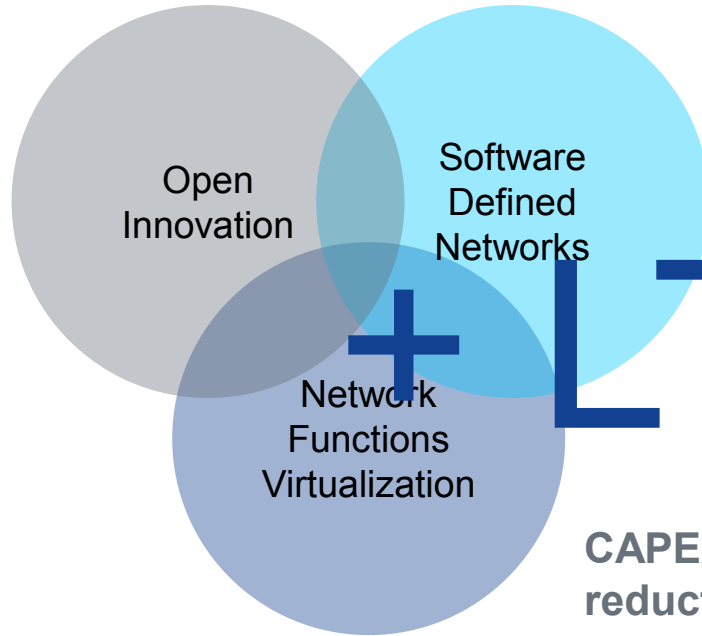
Future Networks 2014

- Michael Jarschel
- 26-09-2014

SDN & NFV Synergy

as illustrated by ETSI

Innovative third-party applications



Network abstractions for faster innovation

+

LTE = ?

CAPEX & OPEX reduction

How can we apply these concepts to the LTE EPC?

Software Defined Networking & Network Functions Virtualization

SDN

- Separation of control and data plane
- Logically-centralized control
- Programmability of the network

Application Plane

Controller Plane

Data Plane

NFV

Relocation of network functions from dedicated appliances to generic servers

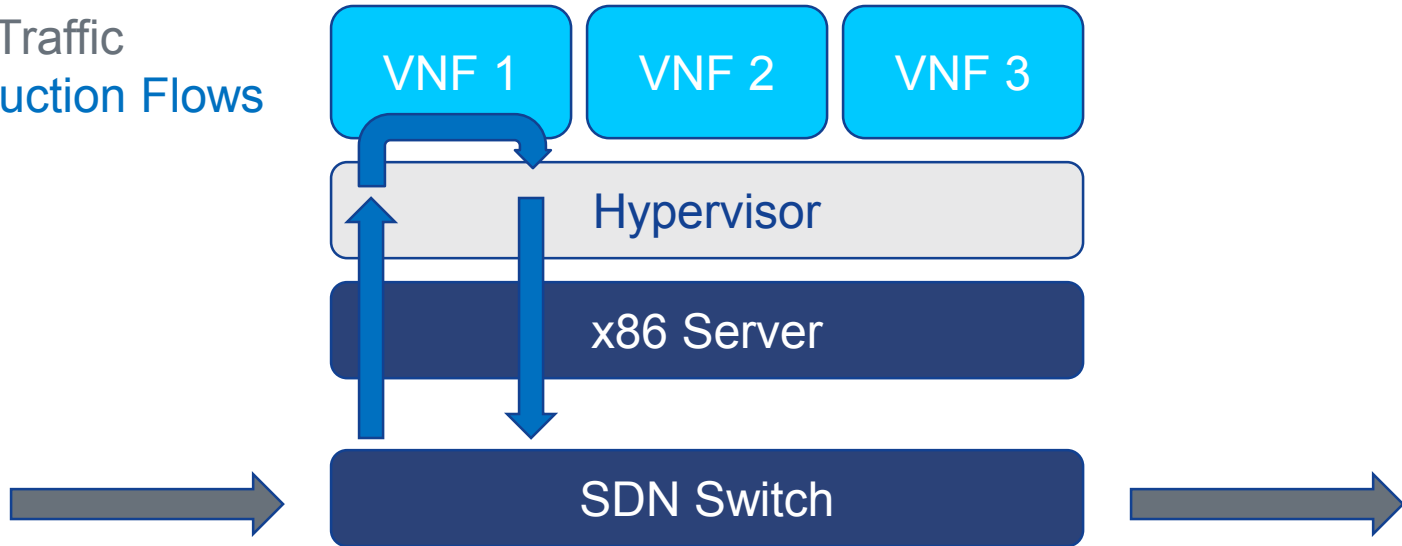
Virtual Network Function

Hypervisor

x86 Server

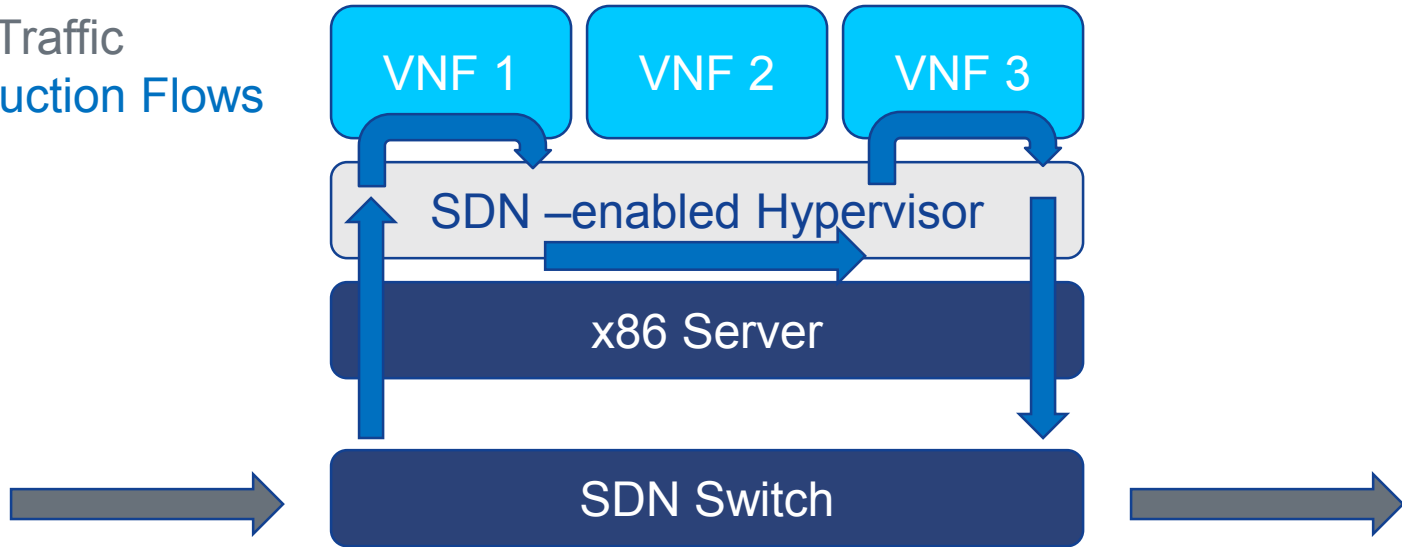
SDN & NFV Deployment Modes: VNF Passthrough

Production Traffic
Select Production Flows



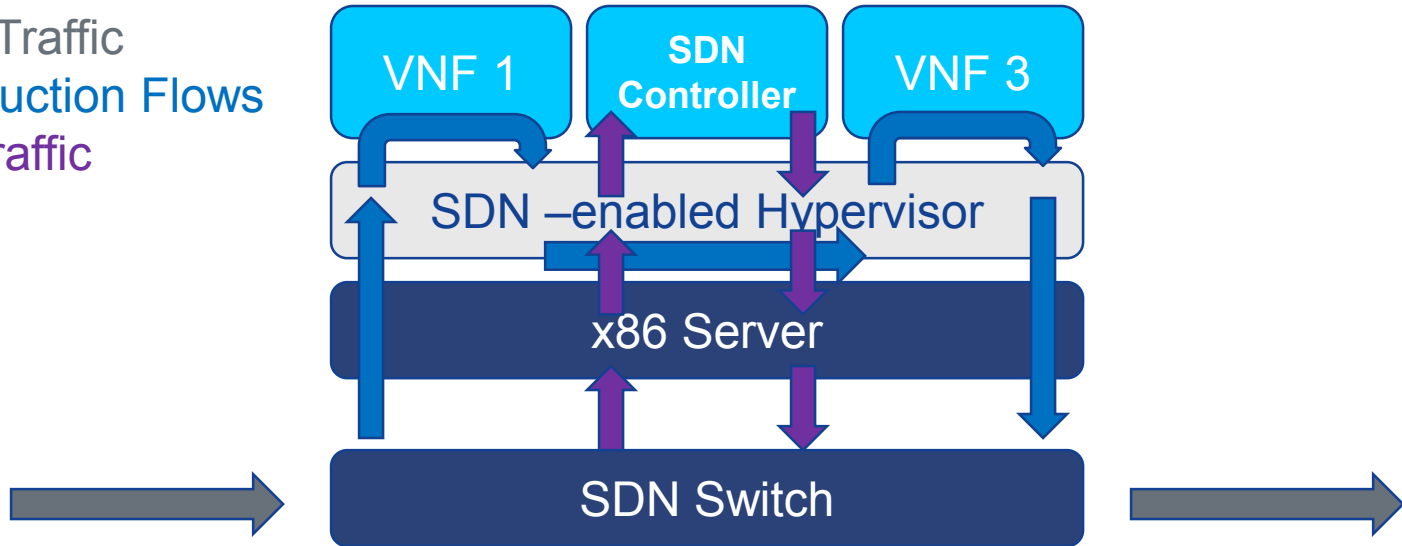
SDN & NFV Deployment Modes: Service Chaining

Production Traffic
Select Production Flows

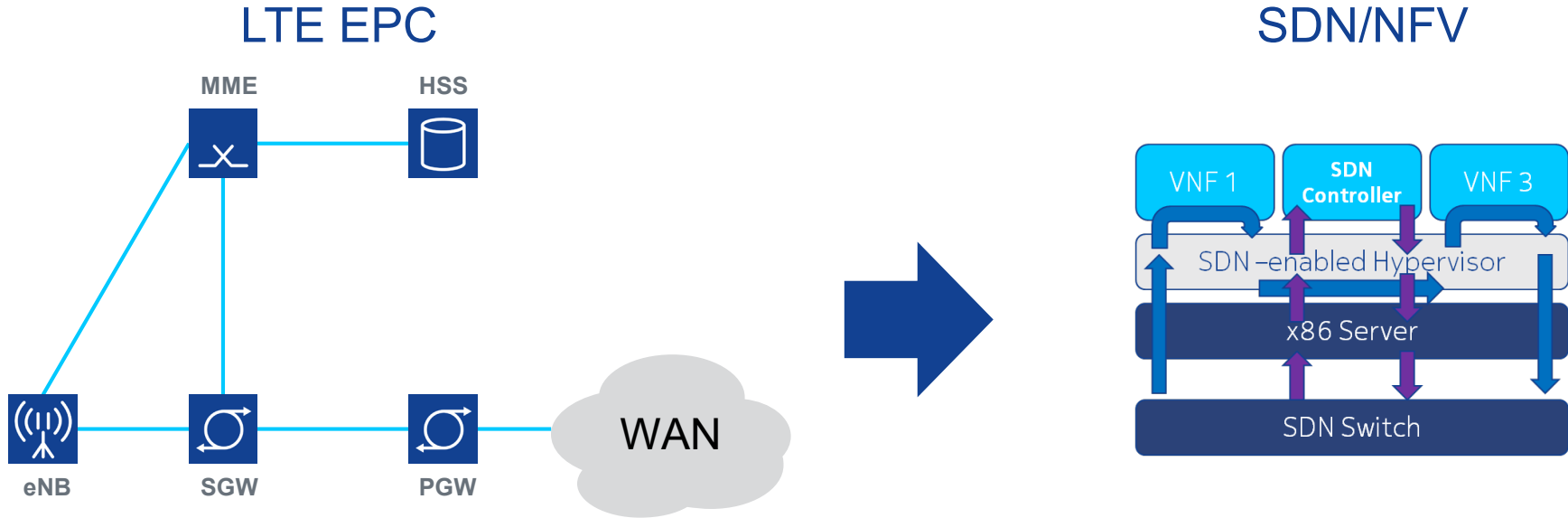


SDN & NFV Deployment Modes: Service Chaining + Virtual SDN Controller

Production Traffic
Select Production Flows
Signaling Traffic



Functional Mapping



How to map the EPC functions onto the SDN/NFV architecture?

SASER SIEGFRIED: SDN-based SGW



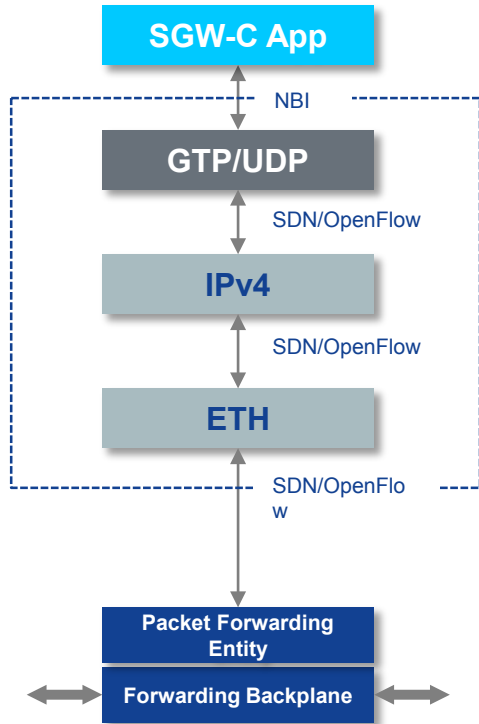
- **First step:** focus on **SGW** functionality
- **Proof of concept** demonstration presented at:
 - Mobile World Congress 2014, Barcelona
 - SASER Midterm Review, Berlin
 - SIGCOMM 2014, Chicago
- **Partners:**



NOKIA



Control Plane Architecture



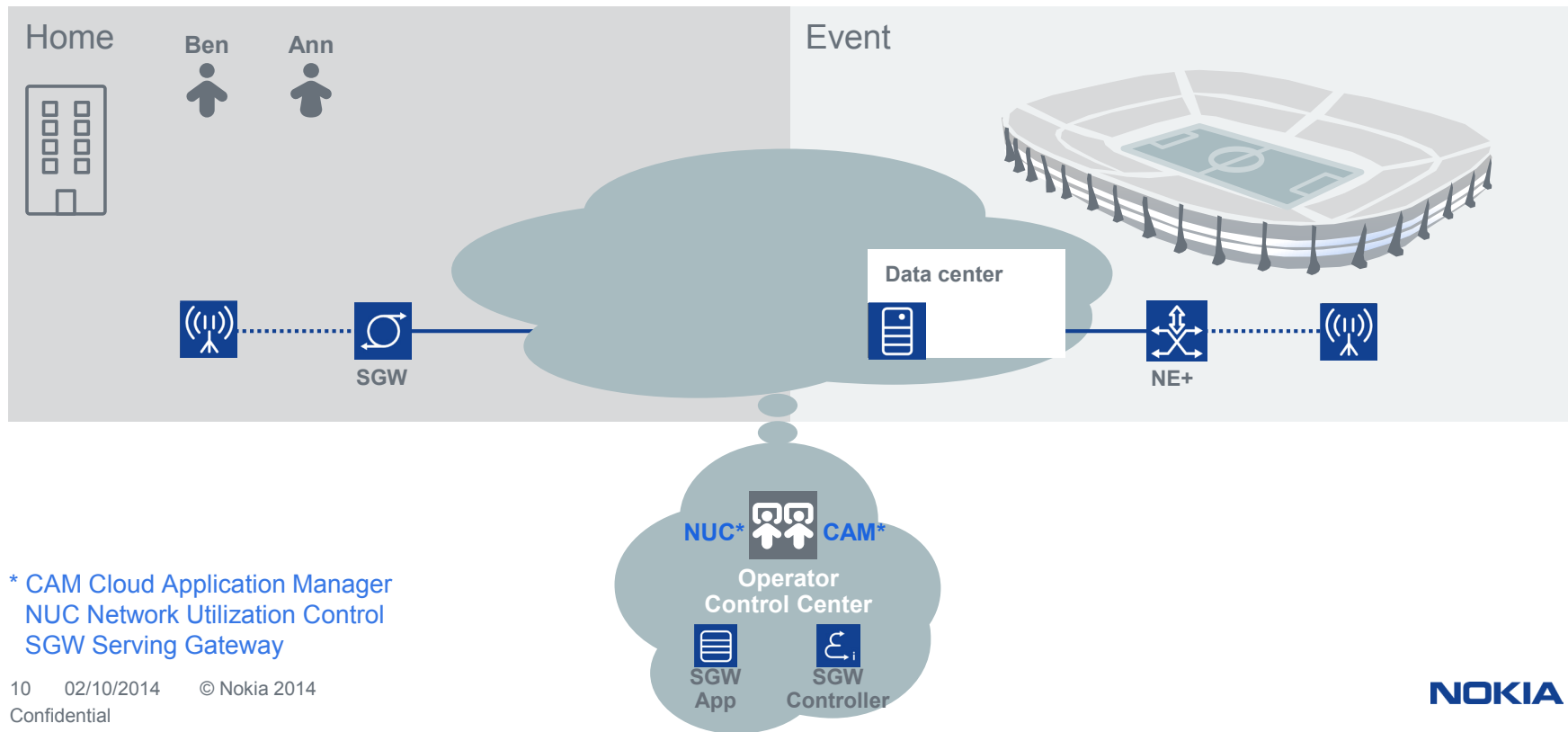
Split protocol stack along transport and adaptation/termination functions

Define a hierarchy of reusable proxy OpenFlow controllers acting as datapaths to the north and controllers to the south

A controller may occupy resources offered to him by the underlying layer, thus shaping the data model offered towards the north

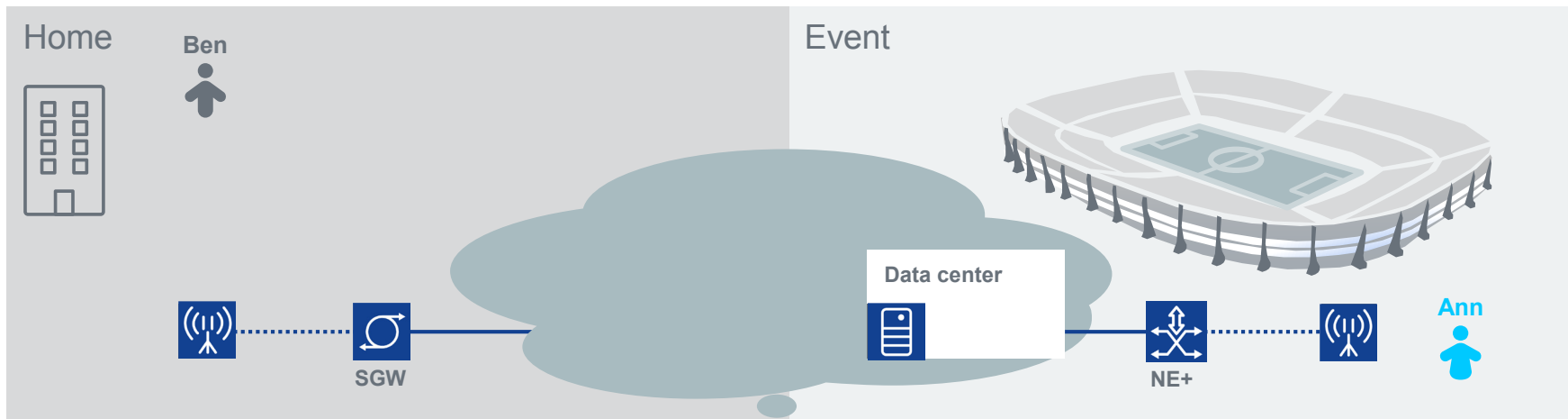
In addition, the set of capabilities (actions/matches) may be restricted in order to suppress cross-layer violations by higher layer controllers

Flexible reuse of existing infrastructure to guarantee best experience



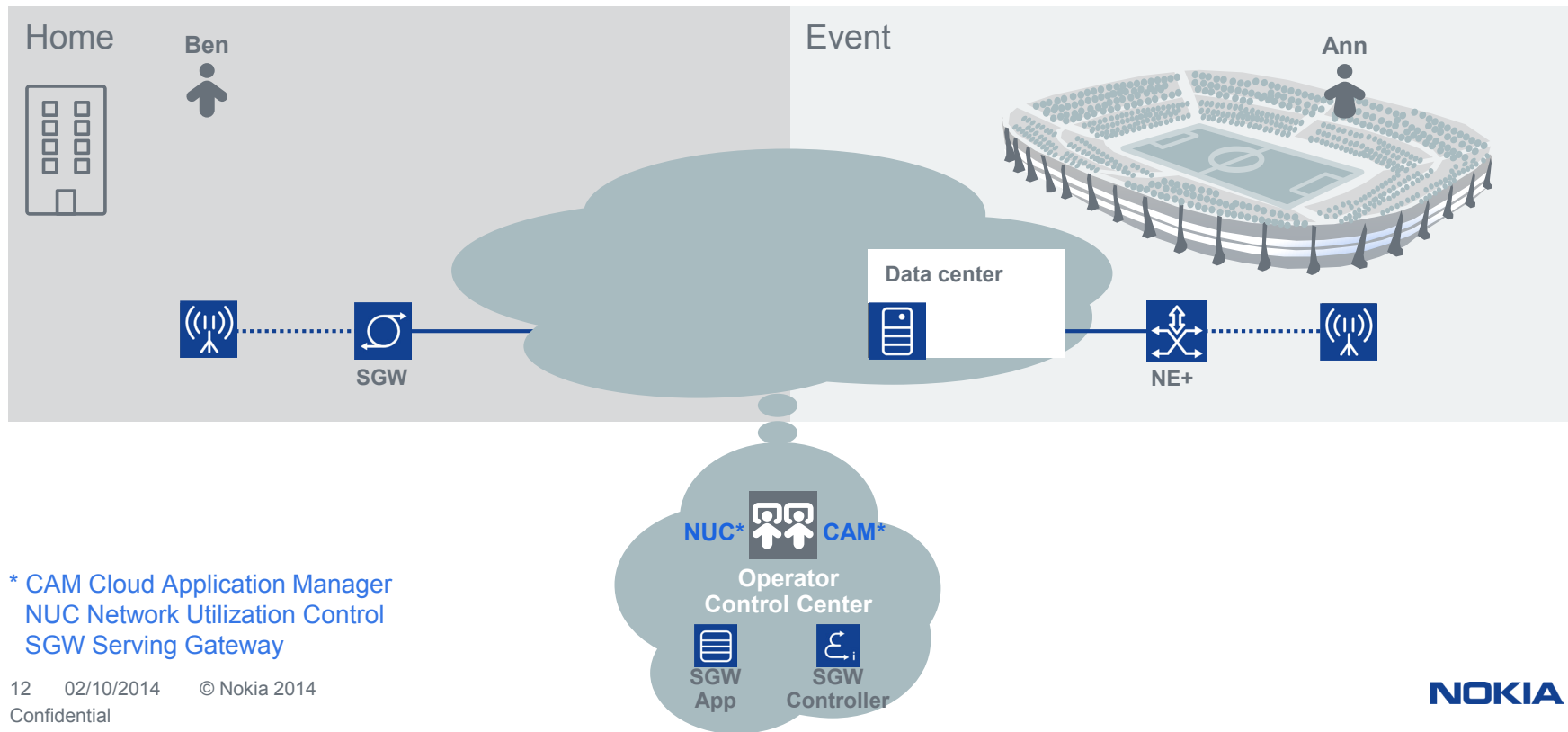
* CAM Cloud Application Manager
NUC Network Utilization Control
SGW Serving Gateway

Flexible reuse of existing infrastructure to guarantee best experience



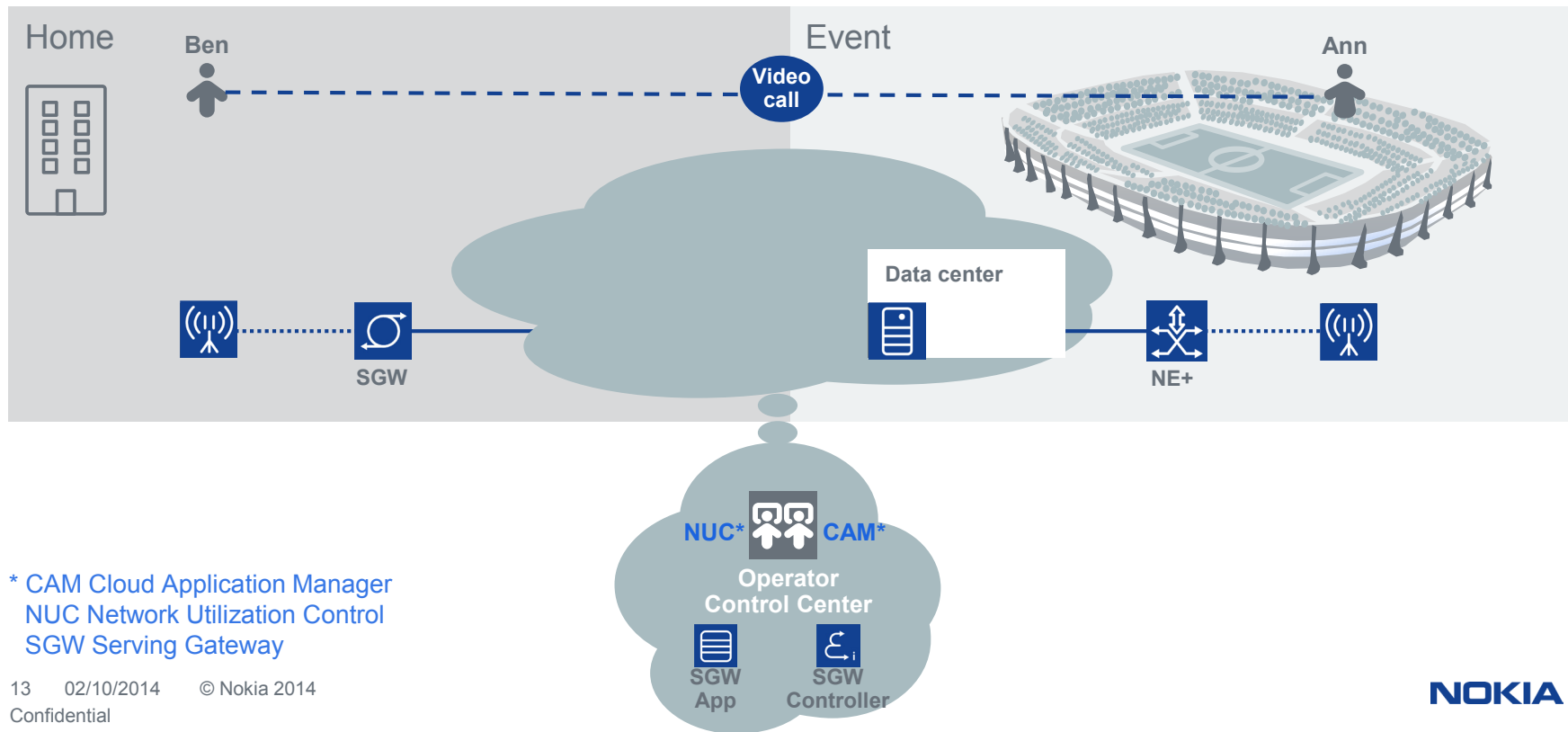
* CAM Cloud Application Manager
NUC Network Utilization Control
SGW Serving Gateway

Flexible reuse of existing infrastructure to guarantee best experience



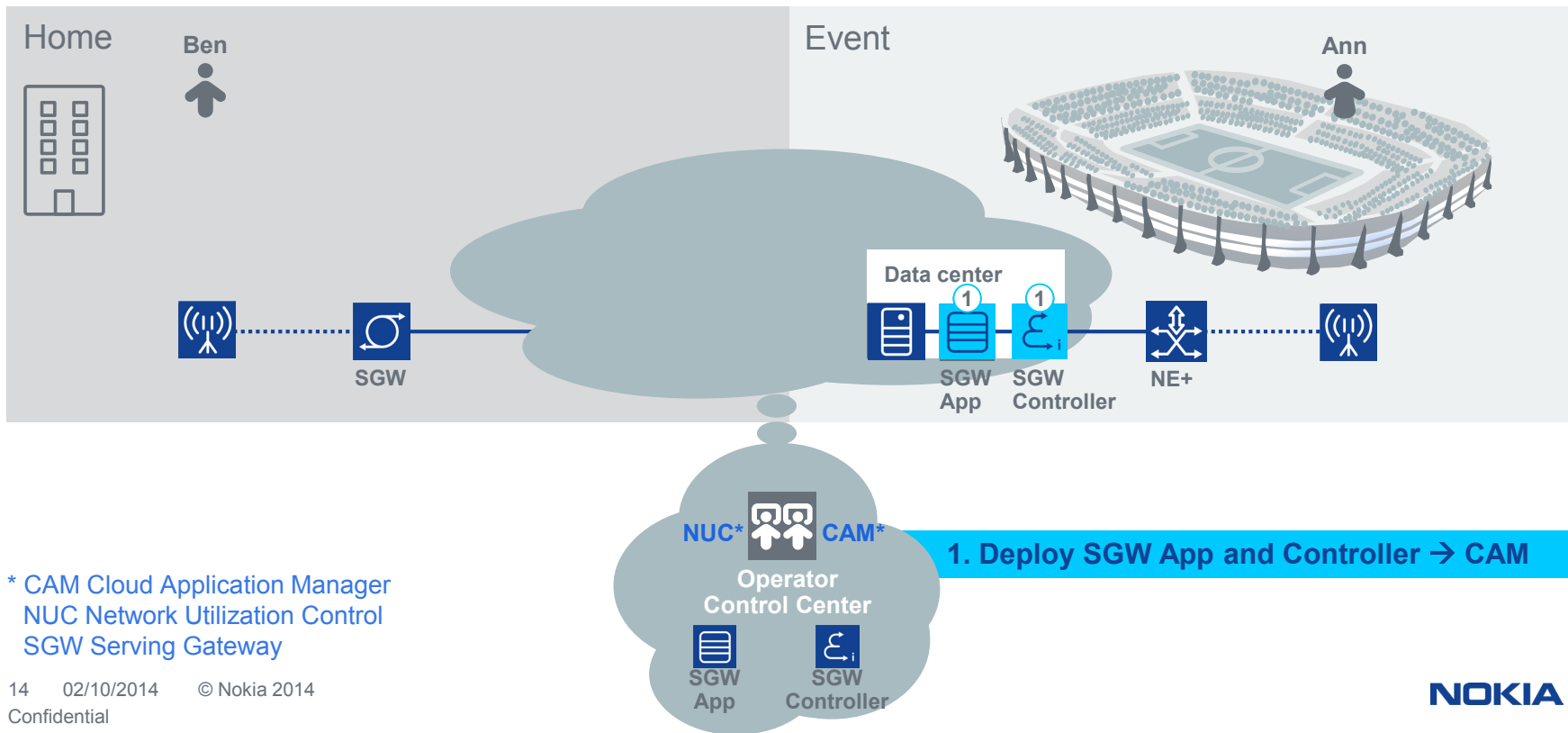
* CAM Cloud Application Manager
NUC Network Utilization Control
SGW Serving Gateway

Flexible reuse of existing infrastructure to guarantee best experience



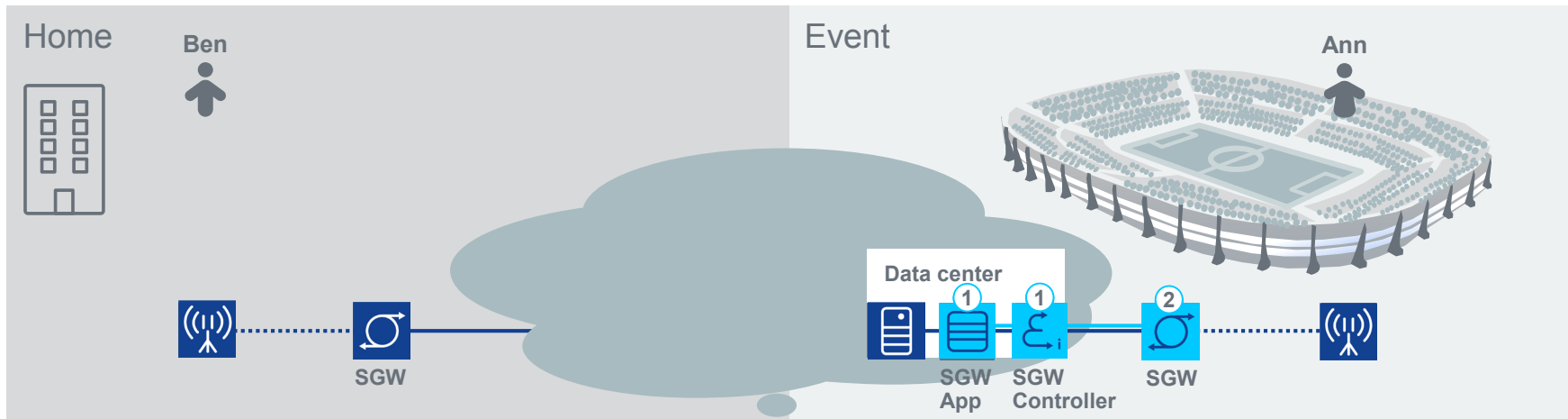
* CAM Cloud Application Manager
NUC Network Utilization Control
SGW Serving Gateway

Flexible reuse of existing infrastructure to guarantee best experience



* CAM Cloud Application Manager
NUC Network Utilization Control
SGW Serving Gateway

Flexible reuse of existing infrastructure to guarantee best experience

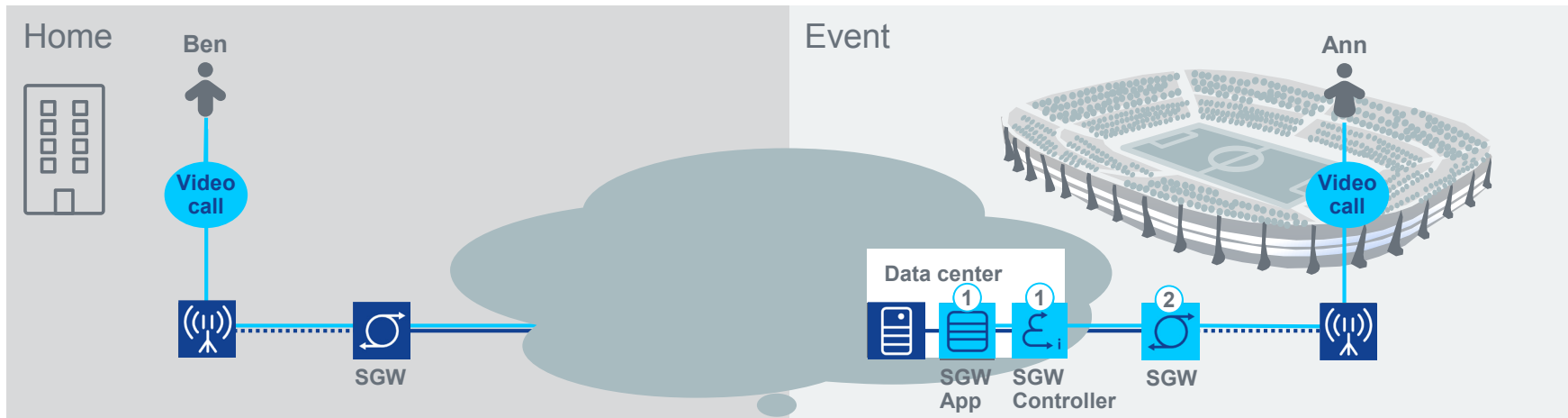


* CAM Cloud Application Manager
 NUC Network Utilization Control
 SGW Serving Gateway



- 1. Deploy SGW App and Controller → CAM
- 2. Program virtual GW → SDN+CAM

Flexible reuse of existing infrastructure to guarantee best experience

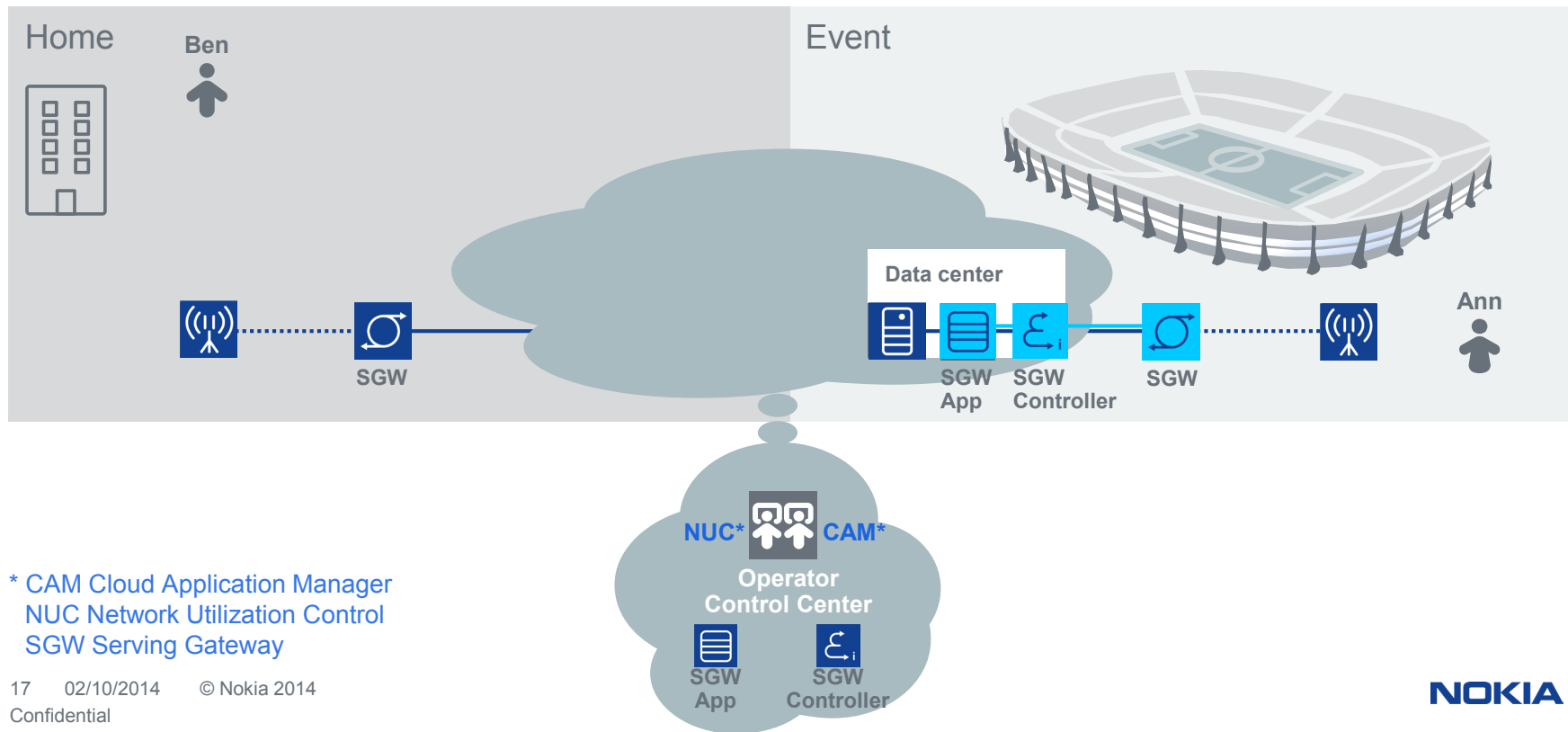


* CAM Cloud Application Manager
 NUC Network Utilization Control
 SGW Serving Gateway

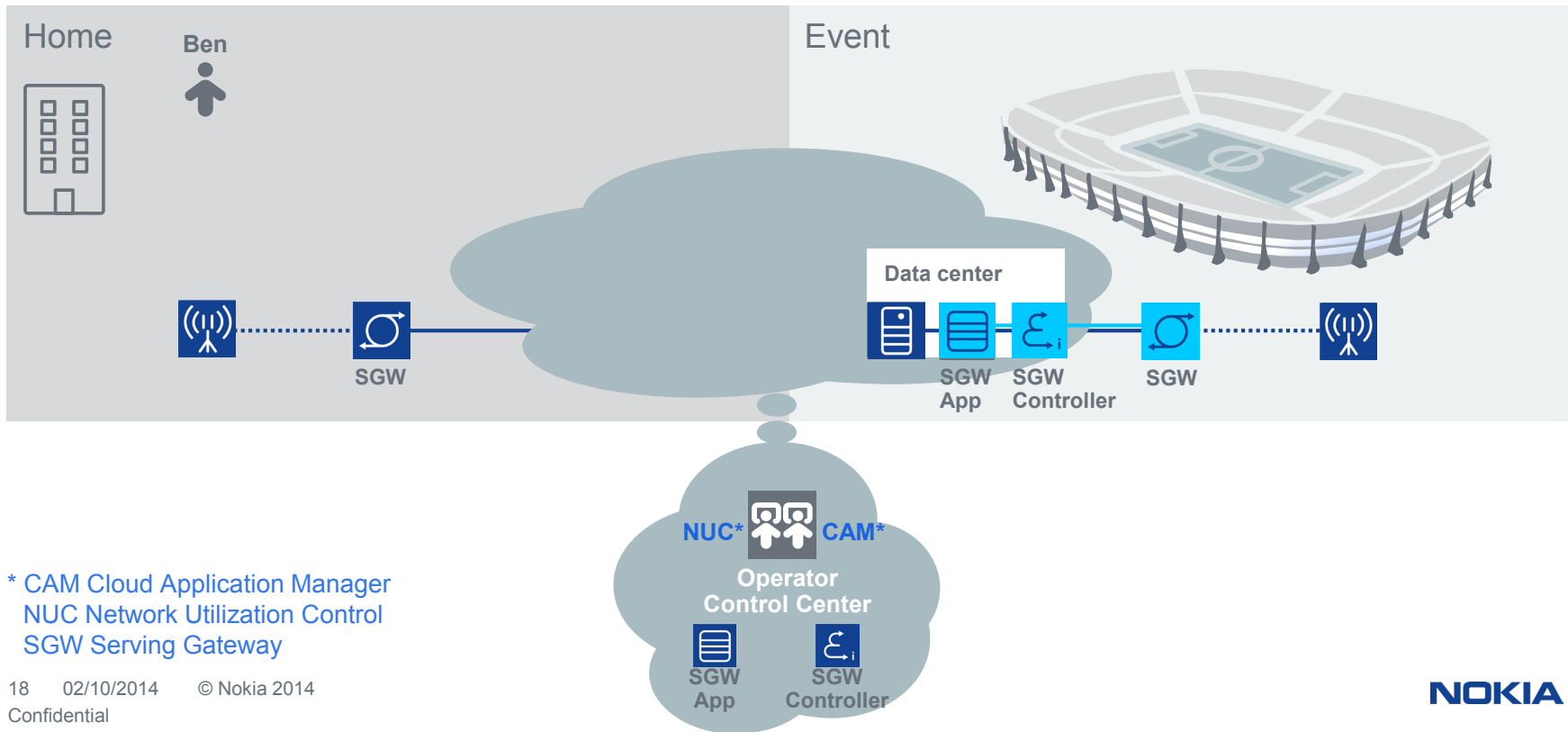


- 1. Deploy SGW App and Controller → CAM
- 2. Program virtual GW → SDN+CAM

Flexible reuse of existing infrastructure to guarantee best experience

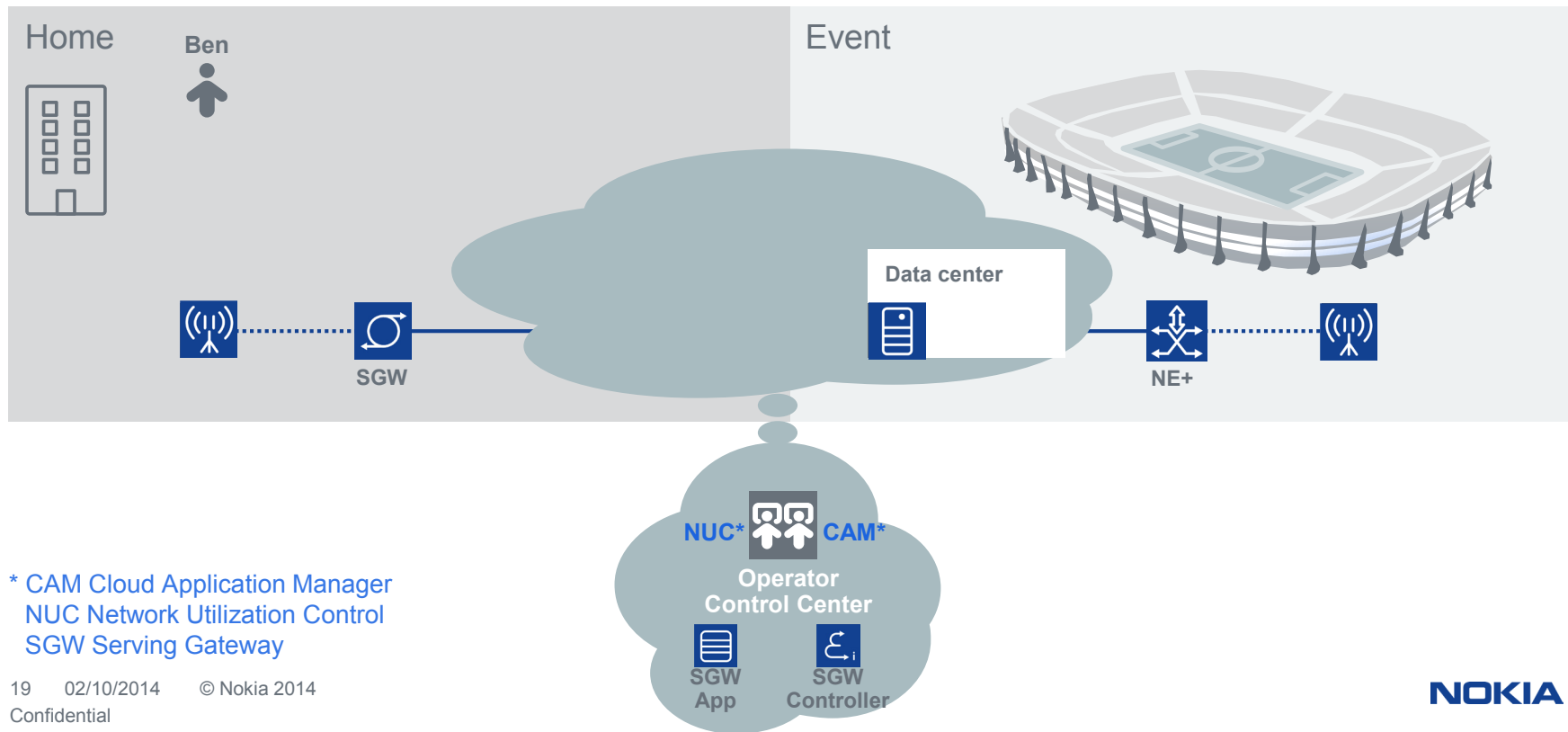


Flexible reuse of existing infrastructure to guarantee best experience



* CAM Cloud Application Manager
NUC Network Utilization Control
SGW Serving Gateway

Flexible reuse of existing infrastructure to guarantee best experience



* CAM Cloud Application Manager
NUC Network Utilization Control
SGW Serving Gateway

Questions ?

NOKIA