

# How to ensure full wireless service in your venue

This presentation addresses the challenges in providing full indoor Mobile services in your venue. Seamless wireless services are essential to assuring Smart-Venue functionality to enhance efficiency and functionality of your venue. JMA Wireless is showcasing how to implement “open systems” that allows a single infrastructure to provide wireless services for all mobile operators.

*Morten Tolstrup & Erik Nilsson*

*JMA Wireless*

**TELECOM INFRAEVENT** 2018

**7 MAART 2018**

**DE KUIP ROTTERDAM**

# Agenda

Who is who in shared Distributed Antenna Systems?  
(*Erik Nilsson*)

Centralized DAS - Showcasing an open system

- Open shared infrastructure 3G/4G
- The business model
- The upgrade path

Case Study: The Aarhus City-DAS

Smart Venues (*Morten Tolstrup*)

- Highlights of Smart Venue Functionality
- Showcase “Smart Stadium”
- “5G” and the future...



# Who is who?

Who are the players and why should they invest?

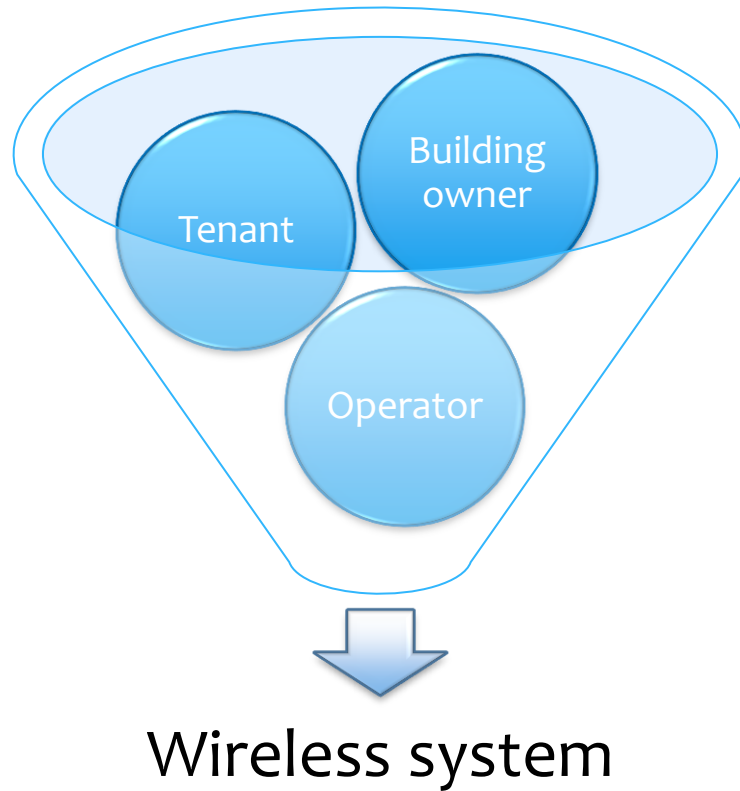
*Erik Nilsson*

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# Who cares about wireless coverage?



## Operators

- Offload the macro network
- Customer satisfaction
- Provides technical approval

## Tenants

- Seamless voice and data traffic

## Building owners

- Pleased tenants and guests
- Increased revenues

# What is the problem?

## **There is increased demand for in-building coverage, because...**

- New building techniques and materials lead to very poor in-building coverage from the macro networks

## **The business is not there, because...**

- Providing in-building coverage does not increase operators revenues as no new subscribers are gained.
- This is especially critical for residential and small/medium office buildings.

# What are the solutions?

In many cases, it is difficult for the parties to agree on how to share the investment...

## Financial solution

- A third party can take the investment, charging instead the other parties a subscription fee

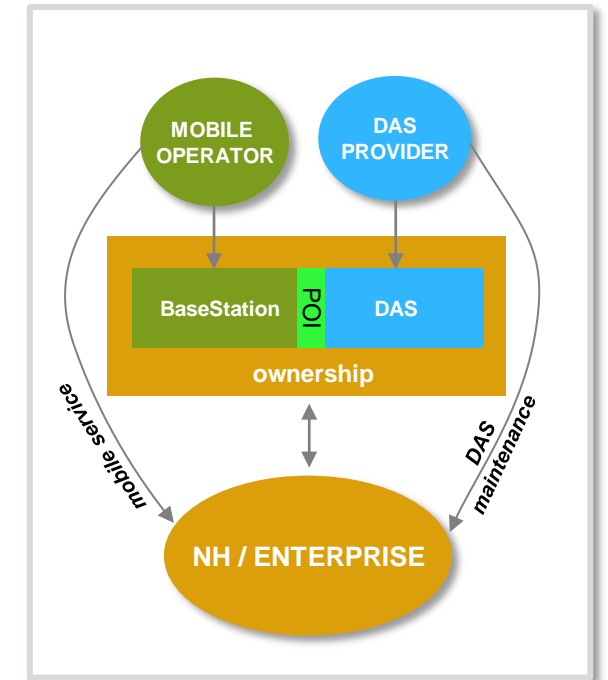
## Technical solution

- A more efficient technical solution can help drive down the investment
- This is done by looking at several buildings at a time, sharing the BTS resources
- We call this Centralized DAS, or C-DAS

# The business model

## Characteristics

- Operating DAS in mobile bands can only be done with the approval of the local mobile operators
- In most regions it is allowed for a third party to own a “distribution system”
- In-building systems are installed and sold by a third party – DAS provider, referred by the operator independently
- Operator typically provides RF source (base station or repeater)
- System is designed to operators' specifications
- Performance is guaranteed by DAS supplier - no risk for the operator
- Maintenance is provided by the enterprise or the DAS provider
- Local, regional differences and challenges



# Centralized DAS

Driving down cost and simplifying the business model  
for in-building wireless

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# The Centralized DAS

## The Solution

In order to unlock the situation, the BTS cost issue needs to be taken out of the equation.

This is done by introducing a new partner, that centralizes BTSs and aggregates the business between operators and building owners.

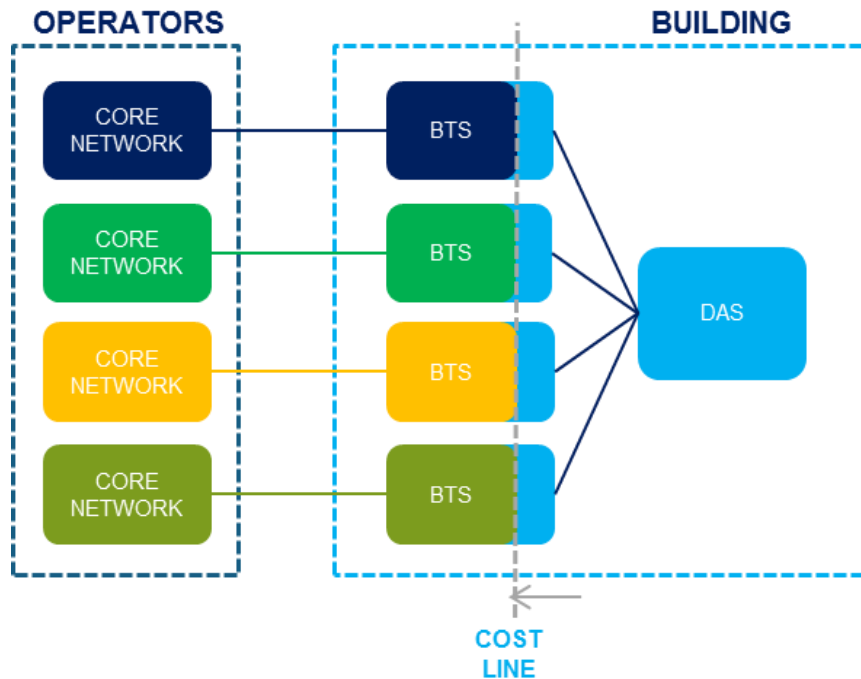
In Aarhus Denmark, JMA has deployed a Centralized DAS that covers buildings all over the city - a **City DAS**

The solution used by JMA in Denmark shows that:

- DAS deployments can be **cost neutral**, or profitable for the operators
- The number of partners for the operators is **dramatically reduced**, allowing a massive rollout of in-building coverage

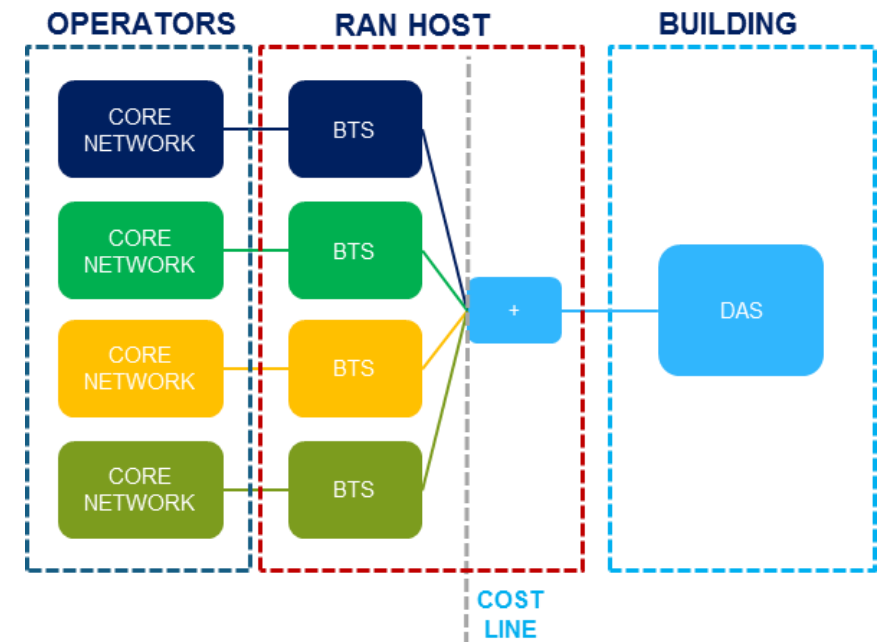
# Changing the business model

## *The past*



- The building owner installs a multi-operator passive DAS
- The operators may or may not choose to connect to the system using BTS, and may request the building owners to pay for the BTS
- The responsibility for the solution is complex - shared by 4 operators and the building owner

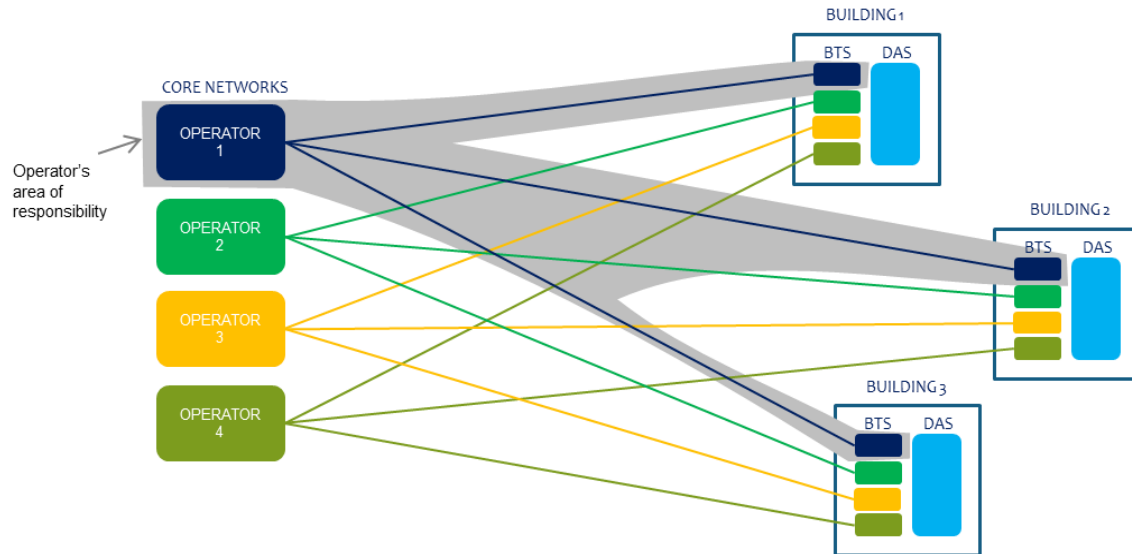
## *The future*



- The building owner installs a multi-operator DAS and interconnects to the BTS hotel operated by the RAN Host
- The operator ensures that enough capacity is available at the BTS hotel
- The responsibility for the solution is clear – the operators have no equipment in the building

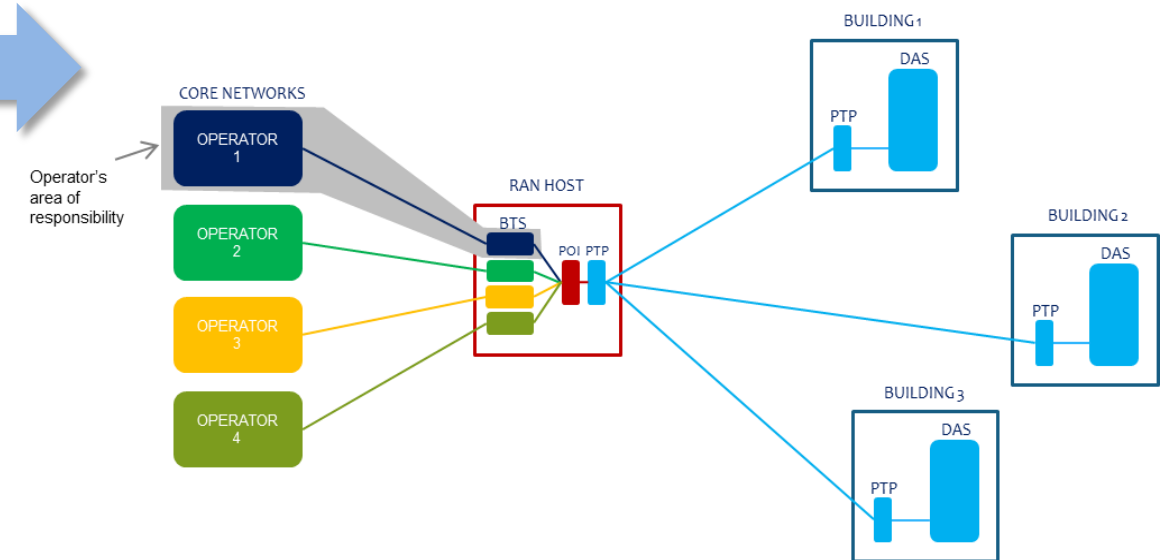
# Operator benefits

## *The past*



- Many BTS installations in remote locations which leads to big investments and high maintenance costs
- Many legal agreements
- Unclear responsibilities

## *The future*

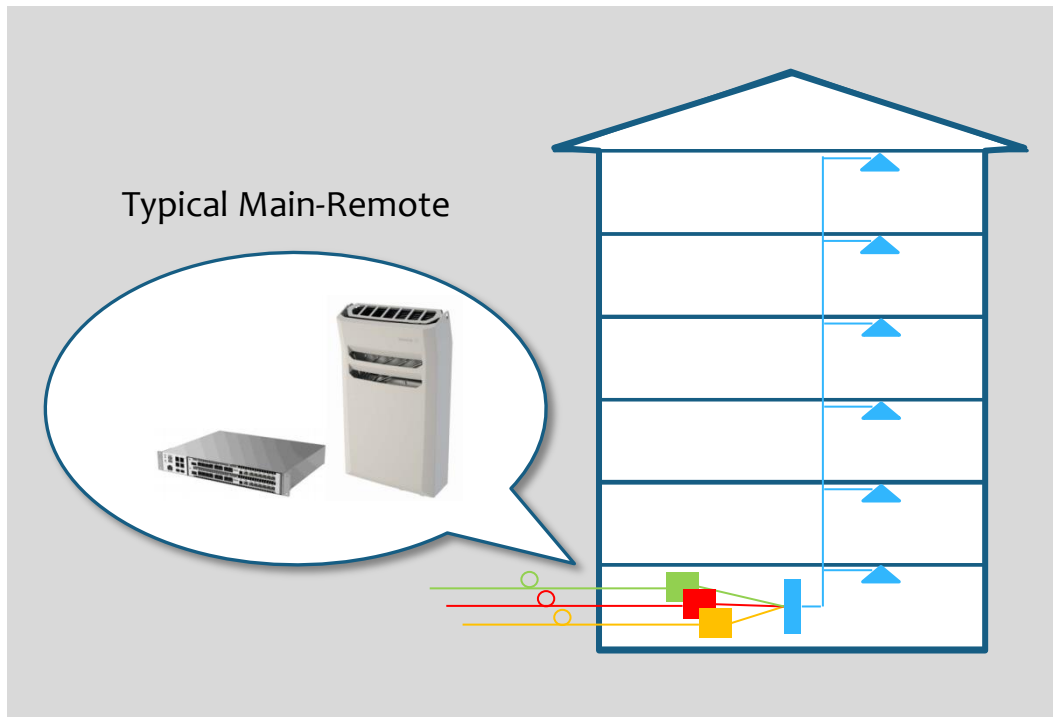


- Fewer BTS locations which reduces CAPEX and maintenance costs
- Dramatical reduction in legal agreements
- Clearly defined responsibilities

# Traditional vs JMA's approach

Main-Remote BTS solution for access to the operators signals

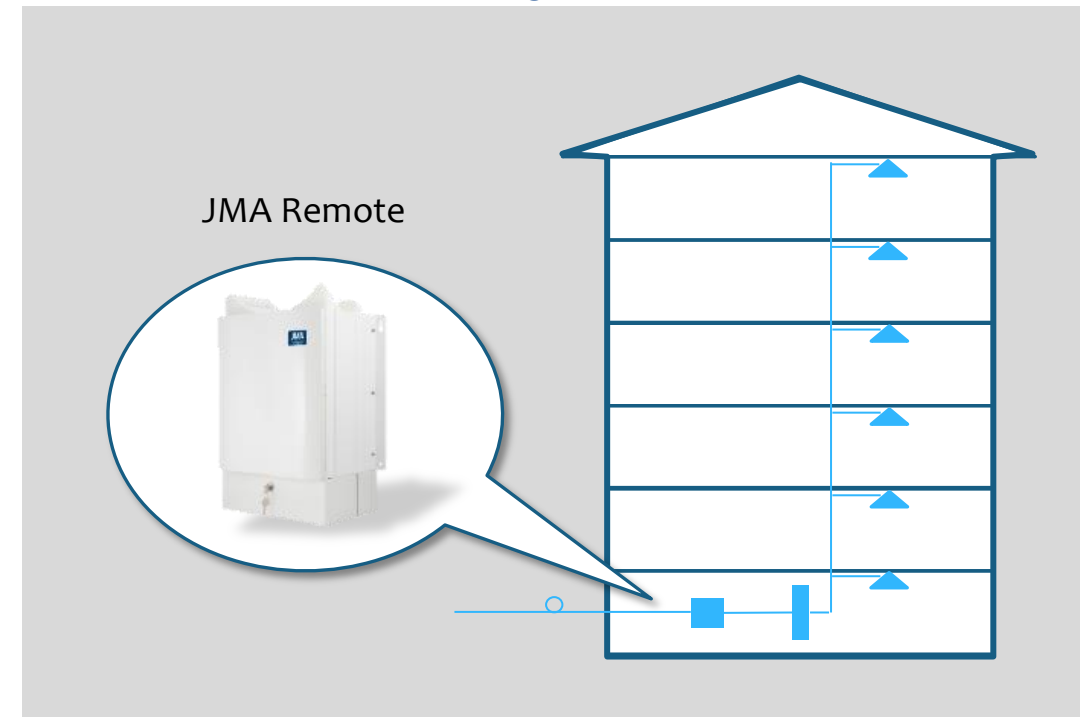
- One system per operator
- One remote per band
- One fiber per building per operator



Centralized BTS

Multi-band, multi-operator remote

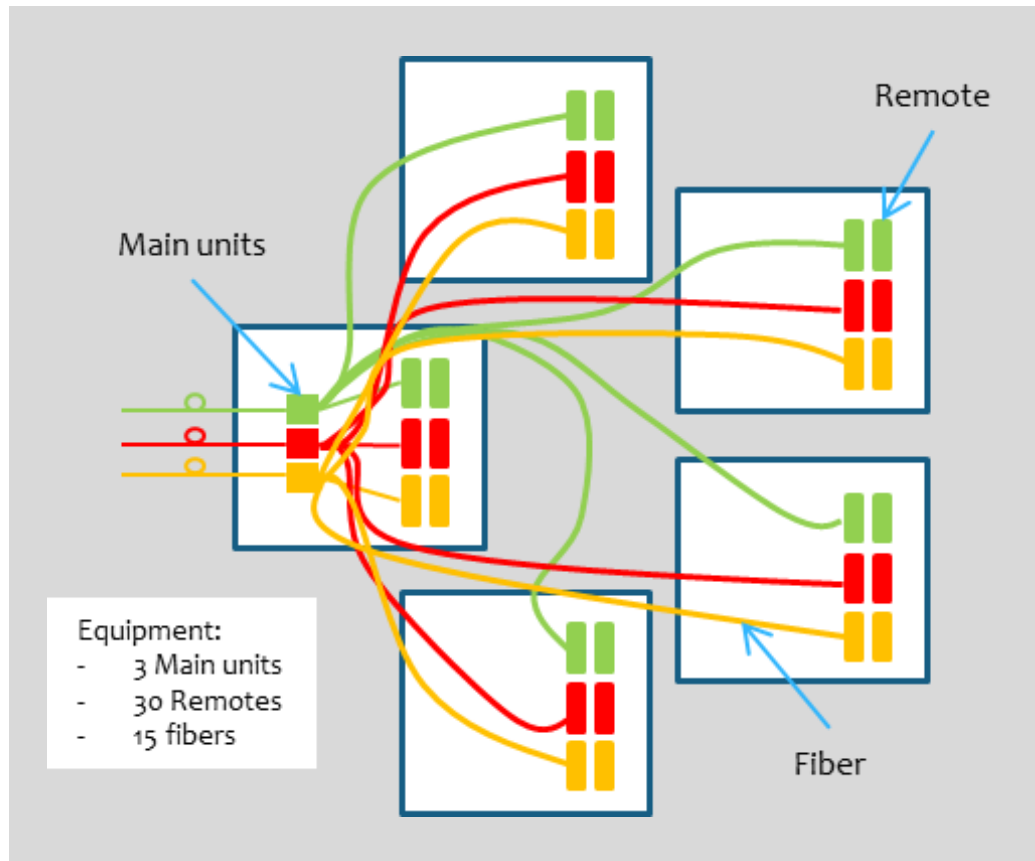
- One shared system for all operators
- One shared remote for all bands
- One fiber per building



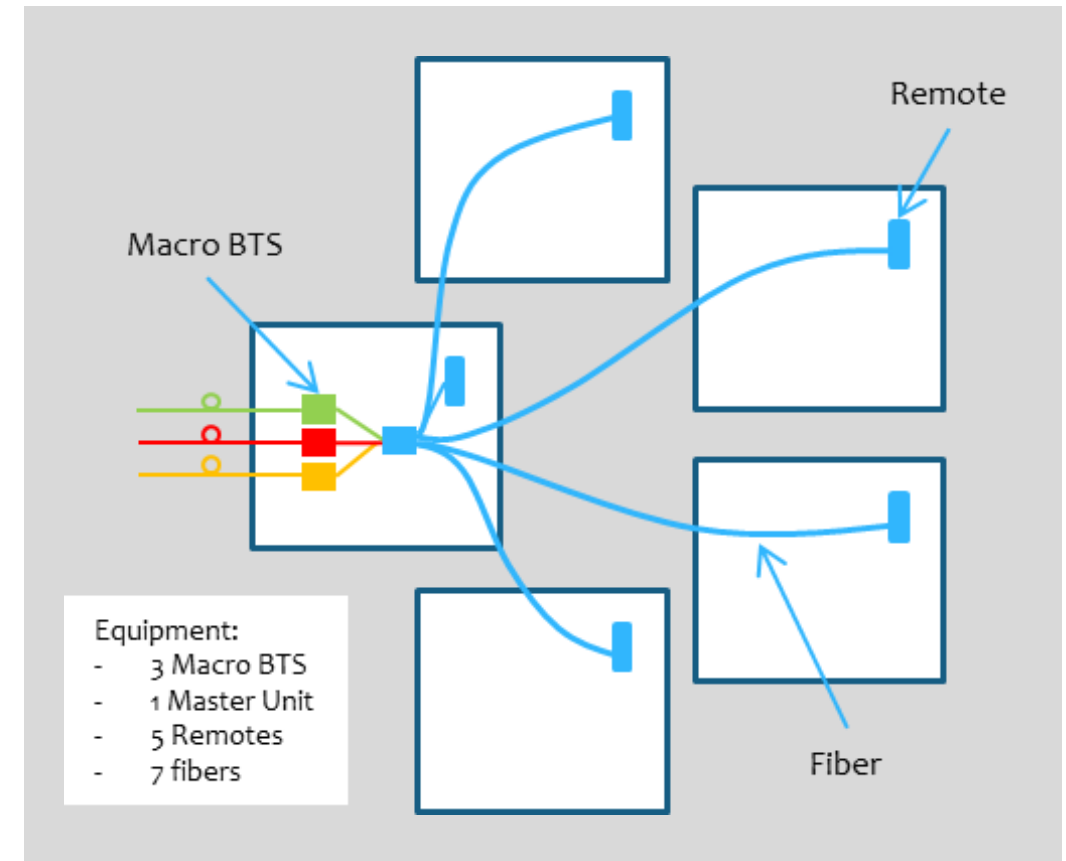
# Comparison example (5 buildings)

Comparing the conventional approach with the JMA solution for 5 buildings, coverage for 3 operators and 2 bands.

## Conventional solution

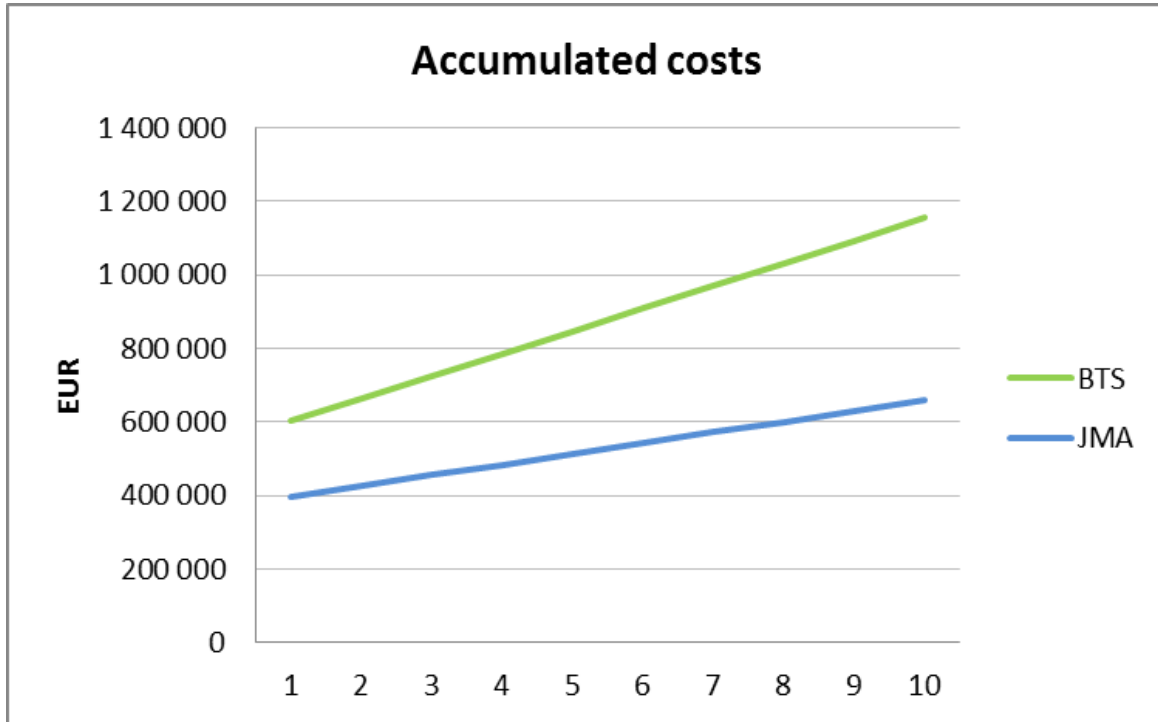


## JMA's solution



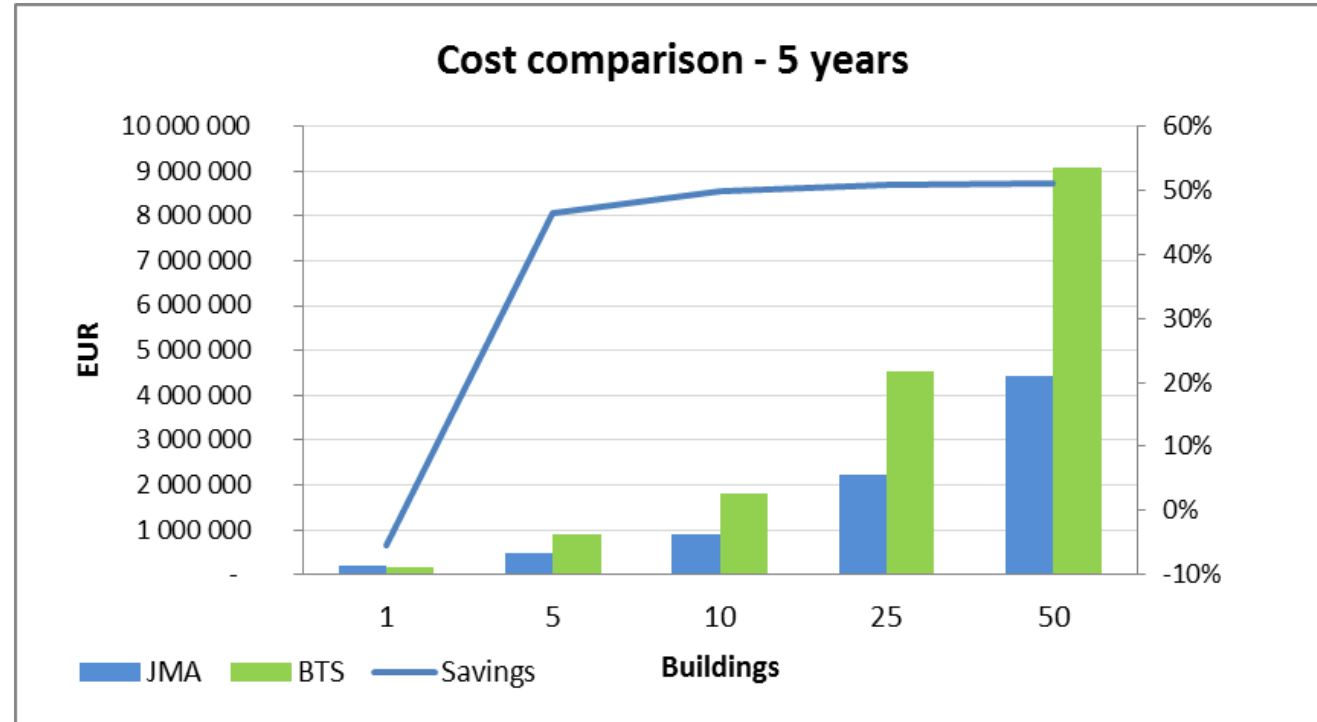
# TCO analysis

## Cost development– 5 buildings



Assumptions:  
- 3 operators  
- 2 bands

## Cost comparison depending on project size



***The C-DAS model saves in equipment,  
power and fiber cost!***

# Case study – City DAS

Covering Aarhus residential buildings from a single location

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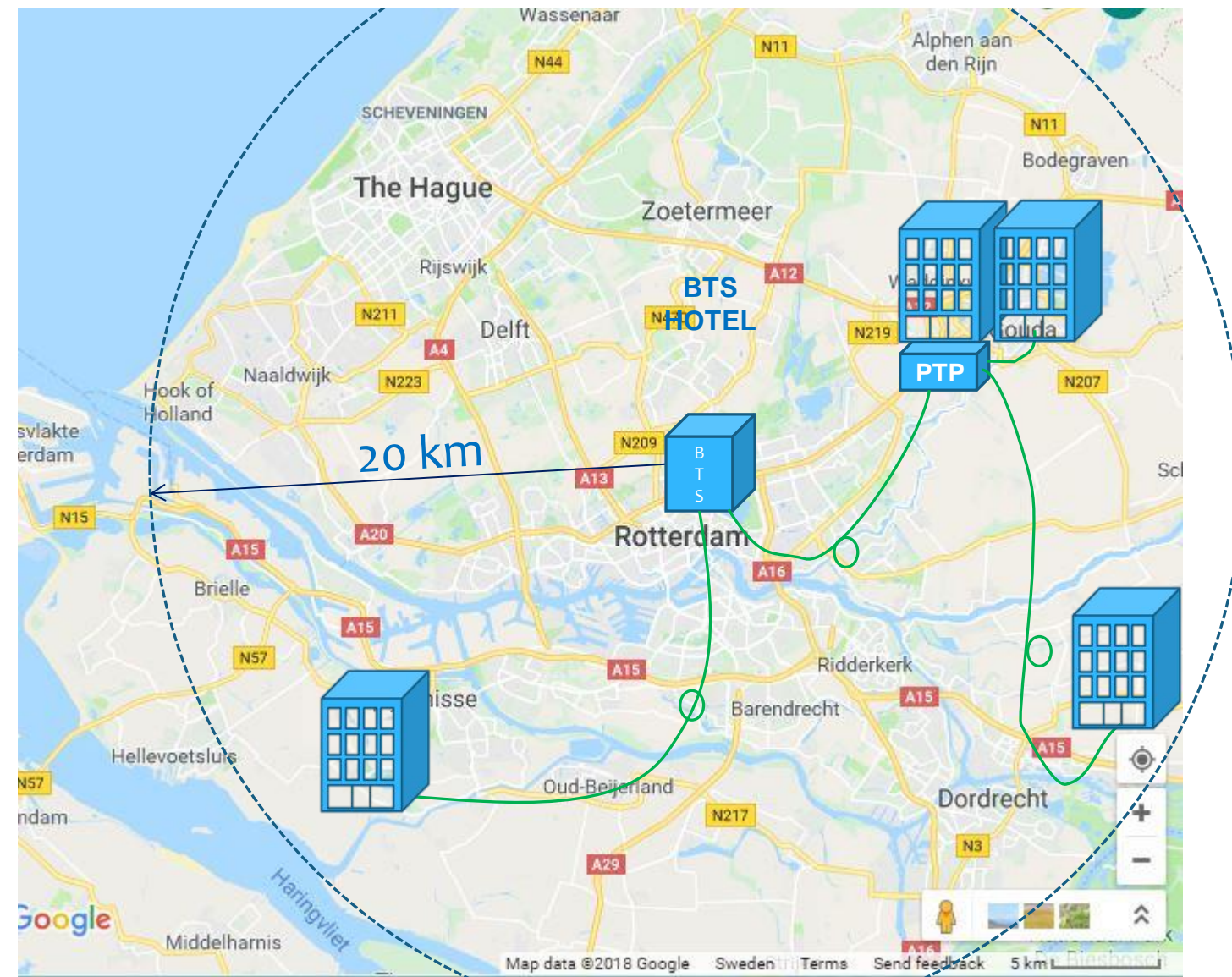
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# Technical solution – The City DAS

## Advantages:

- With a centralized BTS Hotel, buildings in the entire city can be covered without the need for on-site BTSs
- Dark fiber is used to connect BTS Hotel and buildings within a 20km radius (>1200 sqkm)
- With the use of Point to Point equipment, this range can be further increased
- Simplifies the upgrade to 5G in lower bands (0.7-3.5 GHz)



# Aarhus City DAS, Denmark

Stofa owns fiber in Aarhus and has established BTS Hotel in central Aarhus. They offer 3G In-building coverage in 14 new buildings in Aarhus, without on-site BTS equipment.

The system covers 4 residential zones, each driven by 1 fiber from the BTS Hotel, where each of the 4 operators have a macro BTS.

The solution allows coverage to be provided at a much lower investment and running cost, compared to on-site BTS solutions.

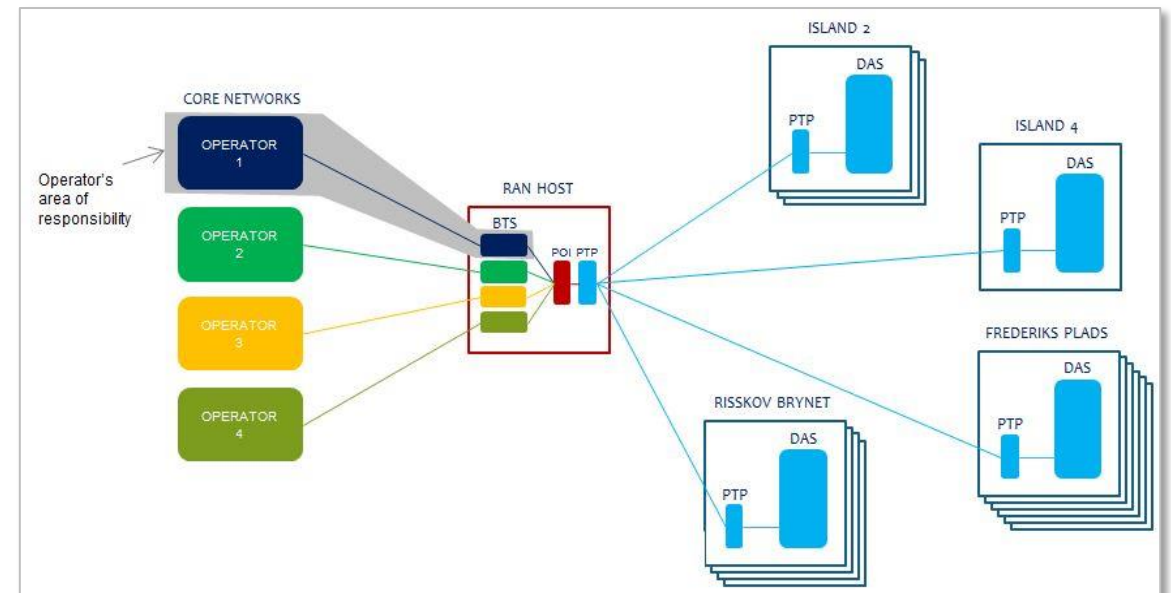
Design and installation is done by KM Telecom and the JMA Teko system is used to feed passive DAS systems in each building.



# Building locations in Aarhus



- Stofa hosts a BTS Hotel in Central Aarhus
- In the initial stage, 14 buildings in four new apartment zones are being connected:
  - Risskov Brynet (4 buildings)
  - Frederiks Plads (6 buildings)
  - Island 2 - Pakhusene (3 buildings)
  - Island 4 (1 building)



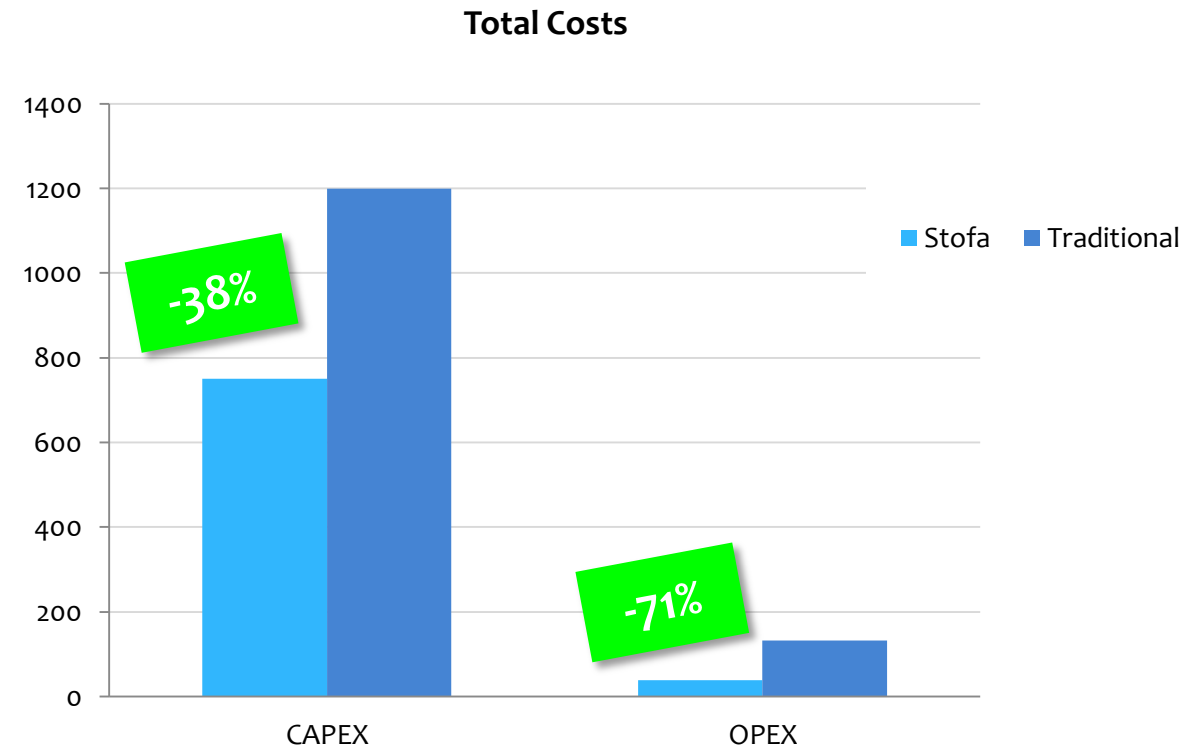
# Benefits to Operators and Building owners

## Operators

- Reduced CAPEX
- Reduced OPEX
- Fewer legal interfaces
- Simplified maintenance

## Building owners

- Less equipment on site
- Fewer legal interfaces
- Clearer line of responsibility
- Quicker decisions





*Morten Tolstrup*

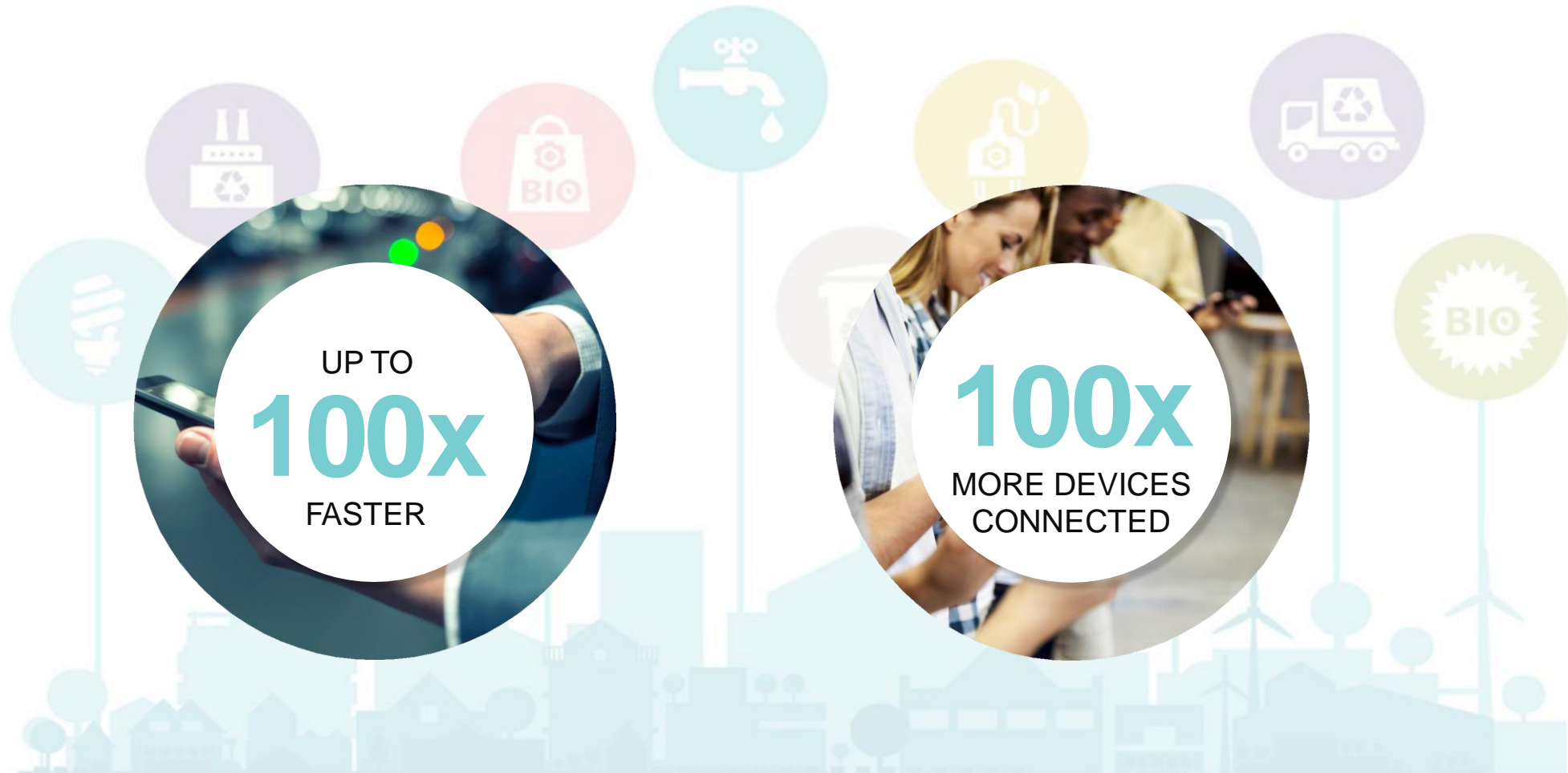
# Our Vision for Smart Venues

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# Smart Venues will be Connected Venues

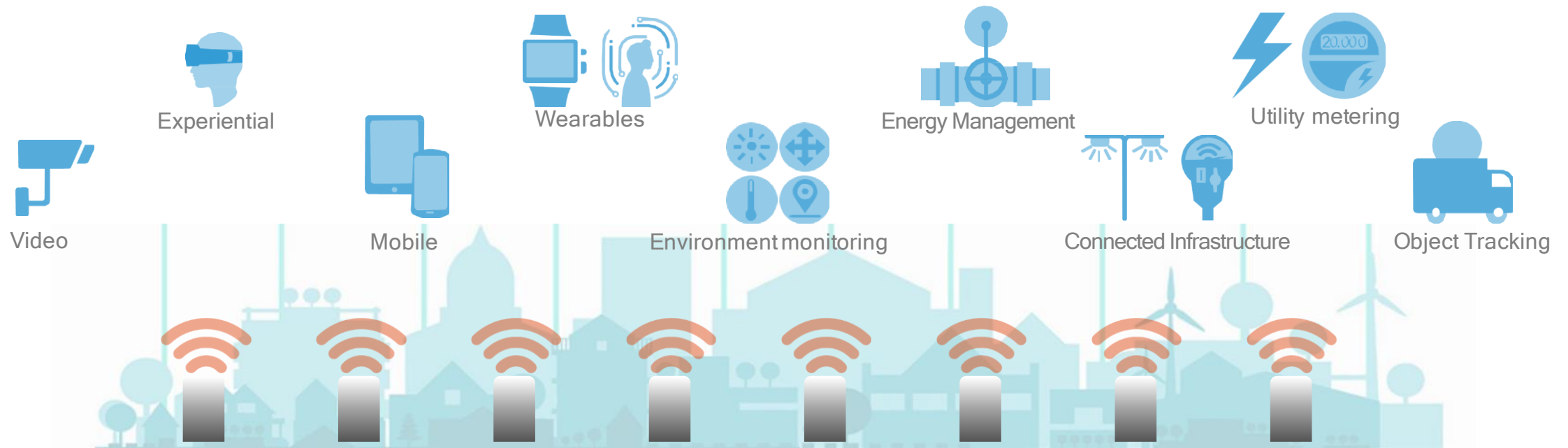


# Flexible, Multi-Technology, Future-ready

Flexibility to empower the city with key technologies consistently across the city

Multi-technology to ensure support for current and forthcoming capabilities.

A platform that is non-cluttering, non-intrusive, and stealthy.



# Over 40 Sports & Entertainment Venues





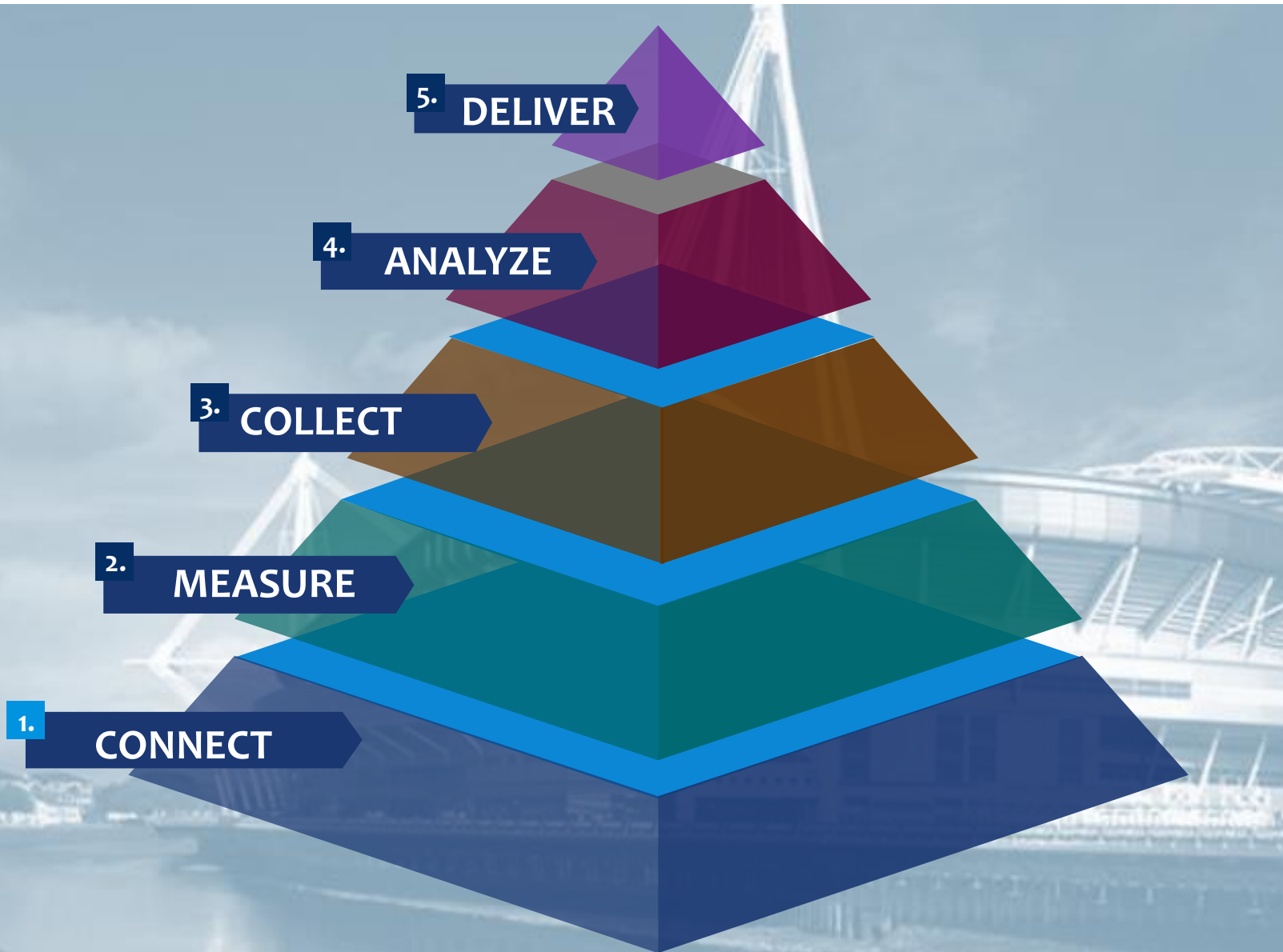
# Enabling Powerful Mobile Interaction

# Envisioning Technology for Smart Venues

## How will we use technology to:

- Make wireless part of the architecture
- Create reasons for fans to be there
- Turn frustration into elation
- Enable richer engagement
- Make experience sharing easy
- Ensure they feel safe
- Gather intelligence on patron activities
- Capitalize on points of spend

# The Steps To Building A Smart Venue



## USERS & CONSUMERS



Transform user and customer experience with engaging, enhanced and autonomous services

## ANALYTICS & INTELLIGENCE



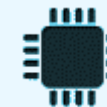
Transform data into insight, action and knowledge. Integrate into business and operational processes.

## DATA FLOW & DEVICE CONTROL



Collect data and manage devices on our network. Use edge computing and gateways prior to sending to the cloud.

## DEVICES & SENSORS

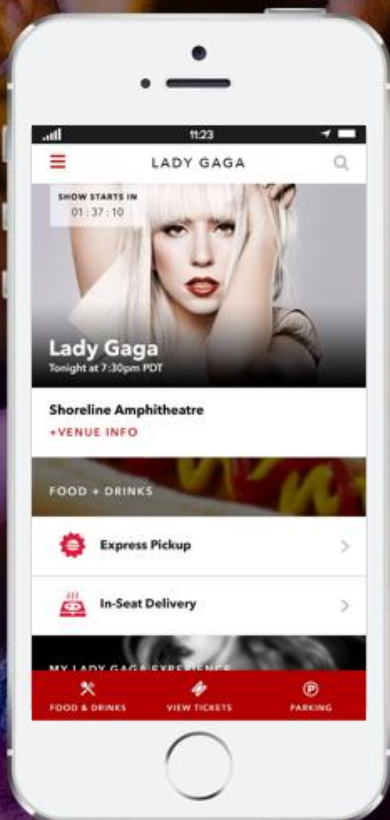


Deploy devices and sensors to measure existing and new data sets. Inventory assets that are not measured today.

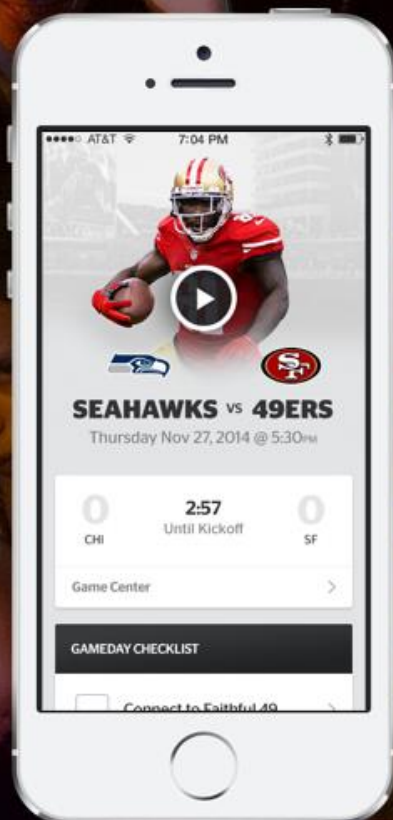
## CONNECTIVITY & ACCESS



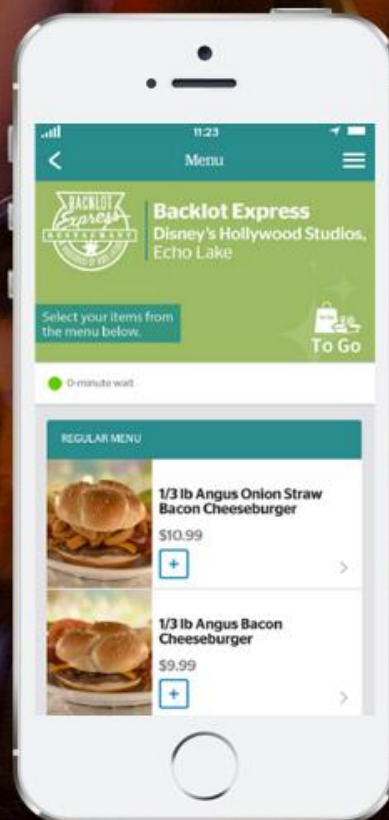
Build a network foundation for connectivity and access for more bandwidth, device types & mobility.



Tickets  
& Parking



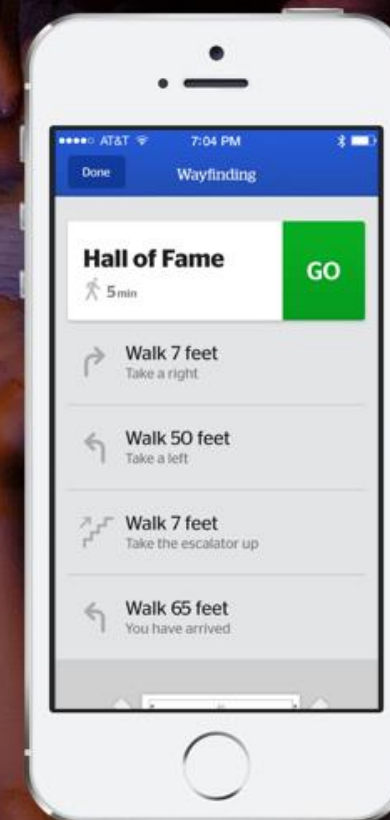
Game/Concert/  
Event Center



Food, Beverage &  
Merchandise



Loyalty &  
Experience

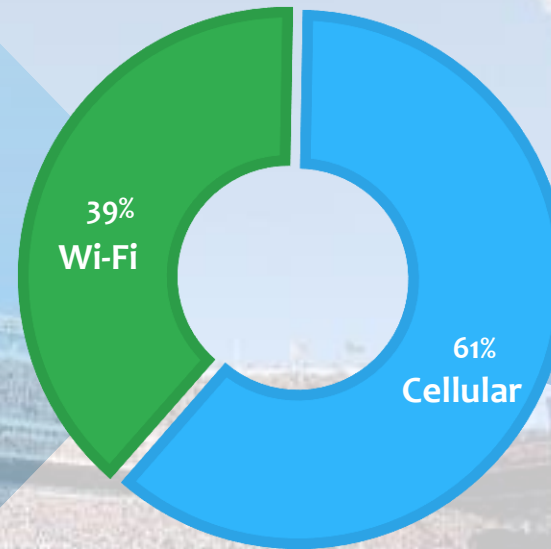


Wayfinding

# Getting the Full Picture of Data & Intelligence

- Only see Wi-Fi based Information
- Cannot extrapolate to Cellular Data
- Unlimited plans driving usage to Cellular

Application	Data Volume
iCloud	3.9 TB
IOS Updates	1.3 TB
Amazon Web Services	732 GB
Google Web Content	564 GB
Apple Web Content	507 GB
Facebook	370 GB
Snapchat	346 GB
Twitter	235 GB
Instagram	150 GB
iTunes Streaming	117 GB
YouTube	73 GB
iMessage	72 GB



No  
Cellular  
Visibility



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# Preparing for



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# Delivering on 5G Infrastructure and Solutions

5G

## Enhanced mobile broadband

- Multi-Gbps data rates
- High capacity
- Uniformity
- Deep awareness



Video



Experiential



Mobile

## Higher reliability services

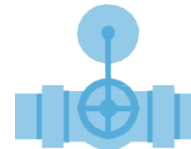
- Lower latency
- Higher reliability
- Higher availability
- Stronger security



Wearables



Environment monitoring



Energy Management



Connected Infrastructure

## Massive Internet of Things

- Lower cost
- Lower energy
- Deeper coverage
- Higher density



Utility metering



Object Tracking

# More reading at [jmawireless.com](http://jmawireless.com)



## CASE STUDY: AXEL TOWERS

An architectural marvel enriches the Copenhagen skyline and the cellular experience

### Axel Towers Selects JMA Wireless for Cellular Connectivity

Axel Towers' copper-clad exterior shines brightly in the center of Copenhagen.

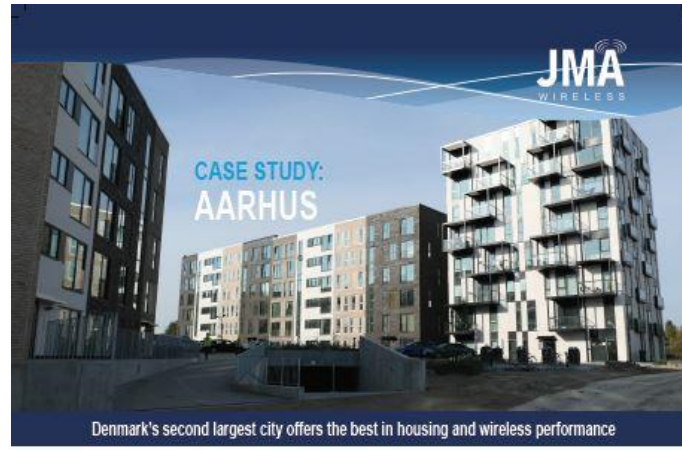


#### Overview: High-End High-Rise Deploys Innovative Wireless Solution

Axel Towers, located in the center of Copenhagen, has changed. The old Scala building has been replaced with a five-tower structure known as Axel Towers. This copper-

clad, multi-purpose building is home to well-appointed, modern offices on the upper floors while the first two levels offer distinctive dining and shopping options. Axel Towers includes 23,000 m<sup>2</sup> of space above ground and 14,000 m<sup>2</sup> below ground.

Axel Towers wanted to provide not only the best in in-building air quality and energy efficiency, but also the best in mobile communications. To ensure superior cellular connectivity, Denmark's largest technical installation company, Kemp & Lauritzen, deployed the multi-carrier, multi-band TEKNO DAS (distributed antenna system) platform from global wireless solutions innovator, JMA Wireless.



## CASE STUDY: AARHUS

Denmark's second largest city offers the best in housing and wireless performance

### JMA Wireless Delivers Ubiquitous Cellular Coverage to Aarhus Developments



#### Overview: Many Buildings, One Wireless Platform

When thinking of major cities in Denmark, Copenhagen usually comes to mind first. However, Aarhus, located 187 kilometers northwest of Copenhagen, is the country's second largest city and has become a key destination for many reasons. It is not only the largest city for industry, services and trade on the Jutland Peninsula, but it also is one of the top 100 conference cities in the world and home to Scandinavia's largest university, Aarhus University. Furthermore, in 2017 it was named by the European Union as the European Capital of Culture, a great honor that has elevated the city's visibility and profile on an international scale. This vibrant metropolis is also the second fastest growing Danish city. To accommodate this rapid growth,

four residential and mixed-use developments initially with these buildings have been constructed in the Aarhus area.

These buildings offer it all to their residents, from underground parking and beautiful city or water views to expansive recreational areas and robust mobile communication. Traditionally, residential complexes have depended upon the outdoor macro tower to provide cellular coverage and capacity. However, the RAM hotel, Stals, knew to ensure powerful and cost-efficient wireless connectivity across these four developments a DAS (distributed antenna system) would be required. Working with system integrator, KM Telecom, they decided to deploy the CDAS (centralized DAS) offering from global wireless innovator, JMA Wireless. This multi-band, multi-carrier offering is an iteration of JMA Wireless' popular TEKNO DAS solution that has been deployed around the globe.



## CASE STUDY: CARLSBERG CITY DISTRICT

Sustainable Environment Incorporates Wireless Innovation

### Carlsberg City District Turns to JMA Wireless for Powerful Cellular Connectivity



The TEKNO DAS provides mobile communications for approximately 10,000 students and 600 staff at UCC.

#### Overview: Technically Advanced Solution Addresses Needs of Urban Development

The Carlsberg name has a rich heritage in Denmark. In 1847 J.C. Jacobsen founded Carlsberg Brewery. He named it after his son, Carl, and the hill (or berg) it was built on. Today the original site of this famous brewery is being transformed into a sustainable city district, located just minutes from the center of Copenhagen. Known as the Carlsberg City District, this area is comprised of 101,000 m<sup>2</sup> of space, including 15,000 m<sup>2</sup> for apartments, 3,500 m<sup>2</sup> for commercial offices, 6,500 m<sup>2</sup> for shops and restaurants, 10,000 m<sup>2</sup> for underground parking, and

57,000 m<sup>2</sup> dedicated to the new Carlsberg Campus for UCC University College.

This forward-thinking urban development includes several innovations, with one of them being a DAS (distributed antenna system). To ensure powerful mobile communications across this new city district, system integrator, KM Telecom, selected the TEKNO DAS from JMA Wireless, a global leader of wireless communications solutions. The multi-carrier, multi-band TEKNO DAS platform is the ideal solution for providing cellular coverage and capacity for the thousands of mobile subscribers living, working and going to school in the Carlsberg City District on a daily basis.

# Come and talk with us!

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Hallway

