

Ulwimo ULtimate WIreless MObility

Developments within

indoor wireless communication

Marketpotential of the many and varying solutions

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Overview:

1.Ulwimo, introduction

- 2.Indoor wireless market dynamics
- 3.Indoor wireless & DAS systems
- 4. Indoor as building facility
- 5. Positioning indoor, DAS & small cells

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Facilitating tenants, enhancing buildings

- · Communication services for tenants and users of venues
- · Wireless communication as an integral building facility
- · Added value to property
- · 'Neutral host' full service lease of indoor wireless facilities
- · Offices, hotels, exhibition- and shopping centers, etc



ULWIMO Providing ULtimate WIreless MObility

The proposition:

- Not necessarily telecom
- Borders ICT/facility management
- Service to venue owners, building users



1. Ulwimo solutions

Today's communication relies heavily on mobile devices and connectivity; outside and inside. Workprocesses and user perception stronly depend on it; always connected Modern buildings are well isolated and are likely to have poor mobile coverage inside Ulwimo facilitates the seamless usage of any mobile device on any networks and any operator within buildings Ulwimo advises/designs/integrates systems that facilitate indoor communication - as a solution to be supplied or

- as a lease or a 3rd party service!

Always in consulation with operators





1. Ulwimo past projects in NL







1.Ulwimo current projects in NL







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2. Indoor Wireless market Mobile everywhere and anytime





An average employee





2. Use of mobiles, some outdoors but predominantly indoor















2. Indoor wireless market **Trend building isolation**

- Buildings increasingly well isolated (energy'labels')
- Not just thermally ③











2. Statistics Cisco

Figure 3. Smartphones Lead Traffic Growth





2. Generic concept indoor coverage





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3. Indoor Distributed Antenna Systems, general topology





3. System schematic indoor





3. Commscope Ion-e

COMMSCSPE°



23 dBm 300 Mhz bandwidth 400 Mhz – 2.8 Ghz

Standard cat 6 cabling 'Drag and drop' capacity allocation





3. Kathrein K-Bow







3 small cell based solutions















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3. Generic network elements: signal source: transport:



repeater

UMTS bts



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Integral building installation

elektrical



ventilation & AC



lighting

heating



building-



automation





In Building Wireless as facility for venues and tenants Just another utility

indoor Wireless | (C)Ulwimo



5. demarcation



Network operator



Real Estate or facility management





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5. Positioning alternatives indoor













5. Opportunities consultancy,

facility- & installation sector

- 1. New market, not yet commoditised
 - Lively market in NL, UK, Swe
- 2. Demand for Mobile drives the niche
- 3. Real Estate sector largely 'overasked'
 - Room for advice and expertise
- 4. Natural role for System Integrators; house-installers
 - Installer already familiar and present and probably close to latent demand
- 5. Exercise your role; expertise can always be

contracted when needed 🙂 !

6. Spectrumusage and role operators; play it correct



Thanks !





