



siae microelettronica



Microwave

Vs

Fiber

(on Operators, Utilities, Oil&Gas, transport
and Gouv/Defense environment)

Introduction

Telecommunication is nowadays becoming crucial to manage and control infrastructure in many environments such as Utilities sub stations, Oil&Gas (OFF and ON Shore platform), rail ways and generally in mission critical applications.

The new generation of wireless networks is developed to manage the sudden increase of data-intensive applications and devices. Wireless carriers need to meet this surging data demand and, at the same time, to use a cost-effective solution on their backhaul networks with the most suitable technology solution.

There are several factors to be taken into account:

- Link distance
- Environment deployment (near and overseas, deserted territories, rural, metropolitan or urban area)
- Deployment time (time to deliver, time to service)
- Availability
- Regulation
- Cost-effectiveness
- Applications

Fiber

Due to intrinsic “unlimited” bandwidth availability, fiber optic network can easily satisfy the rapid growth in capacity demand. Fiber can be deployed in high availability redundant ring or point to point topologies, this type of infrastructure significantly increase costs.

Regardless of the capacity supported, fiber network presents a challenge in terms of deployment costs, varying dramatically based upon distance and deployment area:

- Cost of digging trenches rise linearly with the link span.
- Digging trenches cost per meter depends greatly on where fiber is being deployed (ranging from 20€/meter in rural areas up to 100€/meter in urban areas and more when it is laid under the sea)
- Digging costs also depend on terrain type and could be limited or restricted when mountain, rocky terrain or water surfaces are encountered.
- Furthermore the longer the link, the longer the time to deployment.
- Companies have to work closely with municipal governments for proper permitting.
- High planning time (months) is required with survey and permit requirements.

Microwave

New generation microwave introduced several enhancement considerably increasing transmission capacities from 400Mbps up to several Gbps, making it a compelling alternative to fibre in mission critical services backhauling like CCTV, PIDS, ACS, scada data network system. This high capacity results from a native Ethernet transport, adaptive code modulation, co-channel operation through XPIC (Doubling the bandwidth capacity), MIMO (Quadrupling the bandwidth capacity), Ethernet frame compression and suppression and the adoption of millimetre wave technology.

CAPEX cost of a microwave link (equipments, license-fees, antennas and tower when needed) is generally higher than leased service, but with much lower OPEX costs, making the business case very attractive. This has brought most telecom operator to build their own infrastructure.

If fibre diggings costs are taken into account, microwave results the cheapest solution considering its cost independency to the hop length.

Microwave is well-suited for deployment in Line-of-sight-environments such as rural or deserted areas (Sea, Desert, and Mountain), this however may require deployment of towers if not already available. In urban area tower set-up is typically not required as antennas can be easily mounted on rooftops and existing commercial towers are easily accessible, reducing considerably the total network costs. While for licensed links, after the license has been obtained, installation can be resolved in a matter of a day.

Operators use microwave in their network as primary solution because it can be deployed quickly and inexpensively thanks to its flexibility, offering immediate time to service.

Recently, some operators started evaluating E-Band microwave offering multi Gigabit connection in terms of hours. Millimeter wireless technology works in two 71-76 and 81-86GHz un-channelized bands and maintaining all the advantages of traditional licensed microwave solutions.

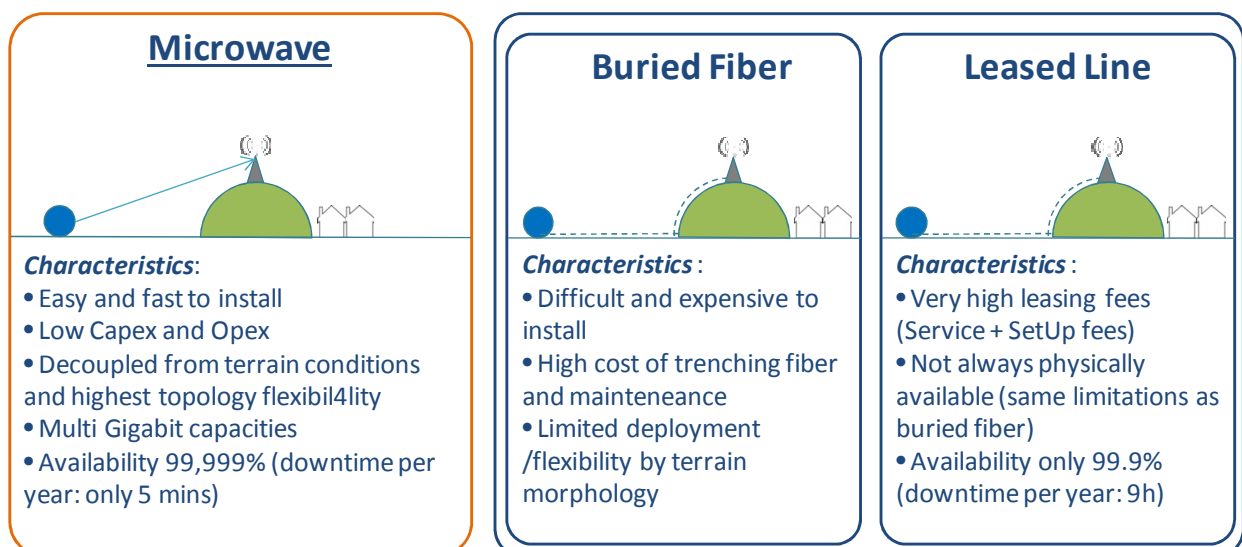
Although high frequency bands are affected by rain precipitations, microwave radio planning based on established precipitation models leads to implementing robust microwave networks that meet the target availability criteria. Furthermore, thanks to the Adaptive Code Modulation, microwave can improve throughput performances while guaranteeing the transmission of high priority data traffic even under highly deteriorated transmission conditions.

Comparison between Microwave and Fiber Optic

Wireless subscribers are consuming more content than ever and operators/Industries are now evaluating backhaul technologies that can meet the requirements of their new service offerings. Furthermore machine to machine communication is becoming more and more present in any data networks.

Because of high installation costs, fiber is a significantly more expensive CapEx option than microwave. The breakeven point between fiber and microwave depends on each specific deployment scenario and it can be calculated based upon a diverse set of inputs such as distance between terminal points, environment area (Sea, rural, metropolitan, urban, fields and deserted areas).

Moreover a microwave network can be set-up in a matter of hours/days, whereas fiber may take months. And in most mission critical network time to service is key like Tetra, Border Control, Radar networks.



Business Case – fibre vs millimeter wave for multi Gbps link

Considering a real case scenario for a 1Gbps capacity for an urban link (city area, medium to highly populated zone) over a 1.5km distance (Enterprise buildings connection, intra campus (e.g. Uni, Health, Governmental buildings) connection, data centre or high capacity data back up)

With this kind of requirement fibre deployment may result difficult due to the costs for digging in urban environment may result prohibitive – considering city centers or historical areas – as well as the start of work depends on area availability (e.g. cultural events) and digging works are susceptible to environment conditions that would bring delay (e.g. heavy raining). These costs may result in hundreds of thousands of Euros.

An alternative solution for going fiber would be to lease a line from a local operator at more than 1.000 € per month (fee depending on countries and operators) + set up fees.

On the other hand considering as an alternative the employment of an 80 GHz microwave equipment inclusive of installation, services and antennas would amount in few tens of thousands of Euros, leading to a breakeven point with a leased fiber of 1,5 years. With the plus of having a fully owned solution, ensuring compliancy to data privacy and security needs.

