KURDISTAN ENGINEERING UNION

Telecommunications infrastructure sharing strategy

Backgrounds, Knowledge, Field Experience

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١٠/١٢/٢٠١٣

This document is written based on my background and experience in telecom industry with high value of my attendance to many workshop and telecom conferences.

Telecommunications Infrastructure Sharing Strategy

The way to optimize the cost and get quicker time to the Market

Abstract

In a developing country like Iraq and Kurdistan region specially, telecommunication business become one of the important sector and priority for everyone in the country.

Telecom being capital expenditure intensive business needs huge investment for startup and initial rollout, then for year on year expansion and growth and technology upgrade.

This business involves significantly high cost of installing and maintaining equipment and high risk of execution.

The idea of infrastructure sharing and cooperation between telecommunication companies lead them to save huge cost of investment in capital expenditure and operation expenditure CAPEX & OPEX, in another hand will speed up roll out and quicker time to the market, without major degradation in service and quality, as well as give greener environment and better looks of our country.

Abrevations

GSM- Global System for Mobile Communication.
CDMA- Code Division Multiple Access
CMC- Communications and Media Commission.
LTE- Long Term Evolution
ITPC- Iraqi Telecommunication and Post Company
BTS - Base Transceiver Station
SMS- Short Message Service
VAS- Value Added Service
MW- Micro Wave
GF- Green Field site or tower
RTT: - Roof-top site or towers
PSTN- public switched telephone network
WiMax- Worldwide Interoperability for Microwave Access
٢G - Second Generation
٣G - Third Generation
٤G - Fourth Generation
(QoS) - Quality of Service
MoU - Minutes of Use
RoI - Return on investment
TCO- Total Cost of Ownership
RF - Radio Frequency
ARPU - Average Revenue per User
CAPEX- Capital Expenditure
OPEX - Operating Expenditure
PDH- plesiosynchronous digital hierarchy
dBA- Unit for sound level measurement
TTM- Time To Market
KRG- Kurdistan Regional Government
MoC- Ministry of Communication
MSC- Mobile Switching Center
HLR- Home Location Registry
VLR- Visitor Location Registry
BTU- British Thermal Unit
A/C– Air Conditioner
Telco - Telecommunication Company

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Part ١: Introduction

١.١ Telecommunication industry overview in Iraq

Telecommunication industry in Iraq is started at very beginning of ٢٠th century and first telecommunication andPost Company has been established at ١٩١٩ under the authority of British mandate.

In ١٩٢٠ first manual telephone switch in Iraq and Middle East has been installed with capacity of few hundred lines and grew step by step until reach its peak in technology and service during ٨٠th.

Until the fall of Baghdad on ٩th April ٢٠٠٣, telecommunication sector was restricted to the state owned company called Iraqi Telecommunication and Post Company (ITPC) under control of Ministry of Communication (MoC) .

At that era, telecommunication service was developed and expanded throughout most of the part of country and provides fixed landline telephony service locally and internationally with fax and telex services in major cities and towns.

Iraq Telecommunication infrastructurewas fully owned, operated and managed by ITPC and distributed among major cities and towns and mainly consist ofpublic switched telephone network PSTN infrastructure for landline connection and connected through Microwave radio links with branches and central PSTN.

After the fall of Baghdad on April ٩, ٢٠٠٣,Iraq ruled by Coalition Provisional Authority (CPA) and the administration of CPA realized that telecommunication plays major role in the economic development of nations and that creating legal certainty for market entrants will enhance economic growth and stability.

On July ١٧, the Coalition Provisional Authority (CPA) announced a competition for licenses for the provision of mobile telecommunications services in Iraq. The Request for Proposals (RFP) was issued on July ٢٨th, with proposals due August ٢١. The CPA held a conference in Amman, Jordan on July ٣١st to discuss the licensing process in more detail. The CPA announced the winners for three licenses, one each for northern, central and southern regions.

On October ٦th the three licenses, selected from over ١٠٠ bids, went to companies based in the Middle East with investors in Iraq and elsewhere in the region. The winner of the license for the central region, including Baghdad, was Orascom Telecom of Egypt..Atheer, which is associated with the Mobile Telecommunications Co. (MTC) of Kuwait, was awarded the southern license.

Asia-Cell, which has been providing mobile services in some northern Kurdish governorates, and expand across northern Iraq. All three plan to use European GSM technology in their respective regions. Each license was for ٢٤ months.

On June ٨, the CPA issued Order #١١ (which gives the Ministry of Transportation and Communications responsibility for licensing all commercial telecommunications services in Iraq.

CPA realized in order to develop modern democracy, it is essential toenhance freedom of exchange of information and for that itneeds professional, free, independent self-regulatory mechanism which assures orderly structuring of communication infrastructure.

The order ٦٥-٢٠٠٤ Coalition Provisional Authority in March ٢٠٠٤, by Paul Bremer deregulate and eliminated the monopoly of the telecom Industry from former MoC and ITPC by establishing independent – nonprofit making telecommunication regulatory authority in the republic of Iraq representing by communication and media commission (CMC).

CMC become uniqueauthorized body to be in charge of issuing licenses to Telecommunication Companies and took all role and responsibility from MoC.

Despite three big GSM licenses which has been auctioned and awarded in ٢٠٠٧ to Asiacell, Zain- Iraq and Korek, CMC awarded three nationwide CDMA and WiMax license in ٢٠٠٦ to ITPC, Kalimat and Itasluna , also award another three provincial licenses for CDMA & WiMax to Fanoos Telecom in seven northern governorates, Baghdad Association in Bagdad and surrounding and Iraq Cell in south region.

In ٢٠٠٣ before issuing GSM licenses, the total number of fixed line was not exceed few hundred thousand with few thousand lines for small GSM networks in Kurdistan region.

Nowadays, the telecom market in Iraq is driven by growing demand for telecommunications services like Voice, SMS, Data and other value added services (VAS).Number of mobile user keep increasing and currently exceed ٣٥ ٠٠٠ ٠٠٠, in parallel to mobile service expansion , CDMA& WiMax operator started to provide their service for Voice and higher speed Data also rapidly grew and expanded as well with all CDMA operators there area almost ١٥٠٠ ٠٠٠ users.

However, building the telecommunication network involves many other things, construction of hundred even thousands of towers, shelters, backup power system such as diesel generators and batters. Densely populated area require more radio resources to ensure best signal in order to handle capacity of number of uses and quality of service (QoS).

Moreover, construction of one site it depend of type whether is Greenfield tower (GF) or Roof Top tower (RT) it cost almost between $ ٣٥٠ ٠٠٠ and $ ١٥٠ ٠٠٠ respectively and large operators like Asiacell, Zain Iraq and Korek would need between ٦٠٠٠- ١٠٠٠٠ sites in order to

provide blanket coverage and grade of services in whole Iraq to obey with term and condition in their license commitments.

With the high demand for quality of service by telecom users, combined with heated competition of almost in maturing market most of these telecommunication companies, like many others have started to construct their own network largely own their effort, independent from each other.

In the developing country like Iraq with population of about ٣٣ ٠٠٠ ٠٠٠, there are more than ١٠ telecom operators licensed by CMC and MoC of Kurdistan Regional Government (KRG) to provide variety of service and Data service and each operator try to win majority of market share by reaching users with quickest time and provide them best quality of service with very affordable price.

As mentioned earlier, building telecommunication infrastructure is time and money consuming, in order to optimize both cost and time also to keep in mind very important factor which is safe environment, it is best and ideal for telecommunication operator to think about sharing infrastructure and it has been proven in many countries and by many operators that can save huge cost of CAPEX and OPEX also reduce time to market and can save environment by reducing number of towers in certain area.

However, sharing infrastructure is mentioned and recommended in the term and scope of the license by CMC and it would be better for CMC give its backing for this idea to become mandatory and force operators to combine their equipment on same site to enhance fair competition.

١.٣ Statement of the Problem

Telecommunication in winning business in the world and operators invested huge money in this business either by paying notable license fee and capital for building networks including infrastructures and each operator rush to return of its investment (RoI)back and enter the market before each other, also to comply with its license agreement to rollout as fast as possible.

As any single personal in Iraq and Kurdistan region have seen and noticed that in any cluster or district especially in residential area there are many towers erected and congested the skyline of cities and towns, despite many complain from resident and neighbors of theses towers with

their fear of radio magnetic waves on their health andnoise and pollution of Diesel generators which runs atany time even after midnight, but these towers in necessary to carry out signal to users in order to persuade their demand for latest technology.

Recognized, these elements of sites (Tower, Generators, Shelters, etc.) are expensive and imported from other countries, we can estimate billions of USD has been invested and alreadypaid by operator to these infrastructure elements and become major factor to increase total cost of ownership (TCO) and respectively affected price of telecommunication in our country and region.

١.٣ Objective of this case study

This case study, aims to examine the benefit that can be derived frominfrastructure sharing, also seeks to explore the extent of collaboration between and among operators while identifying risks involved as well as the benefits in cost optimization and safe of environment.

A- Encouraged operators to extent of telecommunication infrastructure sharing in Iraq and Kurdistan.
B- Analyze the cost impact of engaging in infrastructure sharing and reduce time of rollout.
C- Assessment of infrastructure sharing and its impact on customer
D- Assessments of infrastructure sharing and benefit of environment.

This case study seeks to present and analyze advantage and disadvantage of infrastructure sharing.

١.٤ Logic of the Study

The booming of the telecommunication marked in Iraq and Kurdistan region has been remarkable. This growth has caused huge cost and burden on telecommunication operators and investors as they have to stay continuing to spend huge expenditure on telecom equipment and new technology as well as infrastructure in a bid to gain and sustain competitive advantage.

Nowadays, the telecommunication market in the world and specially in Iraq and Kurdistan approaches maturity and due to hot competition and high cost of talent skill, the average

revenue per user (ARPU) and return of Investment (ROI) dropping, the telecom operators explore desperately to reduce CAPEX and OPEX.

It is a great advantage and logic if telecommunication operators step ahead to adopt the idea of sharing infrastructure, also it very important for regulatory and environmental authority to legislate a rule and framework to encourage and force operators to enhance collaboration to share their infrastructure in order to promote fair competition in the telecommunication market.

١.٥ Scope of Work

The scope of work of this case study focused on infrastructure sharing for wireless networks including GSM, CDMA, WiMax, Wi-Fi, LTE or any similar network, this due to huge number of site deployment and number of operators are significant compared to countries in the region and in the world.

All The data used in this case study are assumed, but it is somehow close to reality and data has been obtained in global market and reliable sources and it is not restricted to any specific vender or operators. Also, due to confidentiality and sensitivity of some data, preferred to use estimated data and presented in general.

Part ٢: Main Technology of Iraq Market

٢.١ Overview of Wireless Telecommunication networks

The wireless networks mean any network transmit elector magnetic wave in order to transport signal from transmitter to any receiver here mainly focused on GSM all generation, CDMA, WiMax and LTE despite of range of frequency used.

In order to deliver clear understanding about this case study and the nature of wireless telecom business, brief information about network architecture and component is essential to illustrate the nature of business and network.

Fundamentally, a radio component in Base Transceiver Station (BTS) is the first link in the connection between Mobile Station (MS) and source of information.

Mobile device and BTS communicate with each other through electromagnetic signal transmitted from BTS antenna through air.

Mobile communication is two –way radio transmission and it transmit on a local basis between ٢-٢٥٠ watts. Theoretically, radio signal can travel tens kilometers depends of range of frequency (lower frequency can travel further than high frequency), transmit power as well as terrain of landscapes and nature of population density also affect signal penetration and notable deferent could be seen between metropolitan deployment and urban.

To provide wireless communication service across the country, a network of many low power BTS needs to be deployed, each BTS provides a range of coverage depend of the range of frequency(see figure ١ for more clarifications)to cover limited range between ٢٠٠ m- ٥٠٠ min metropolitan area and referred as a Cell.

A Cell in the basic unit of cellular system and defined as the area of coverage given by one BTS with commonly used ٣ sets of antennas installed in ١٢٠° in order to transmit signal in ٣٦٠°.

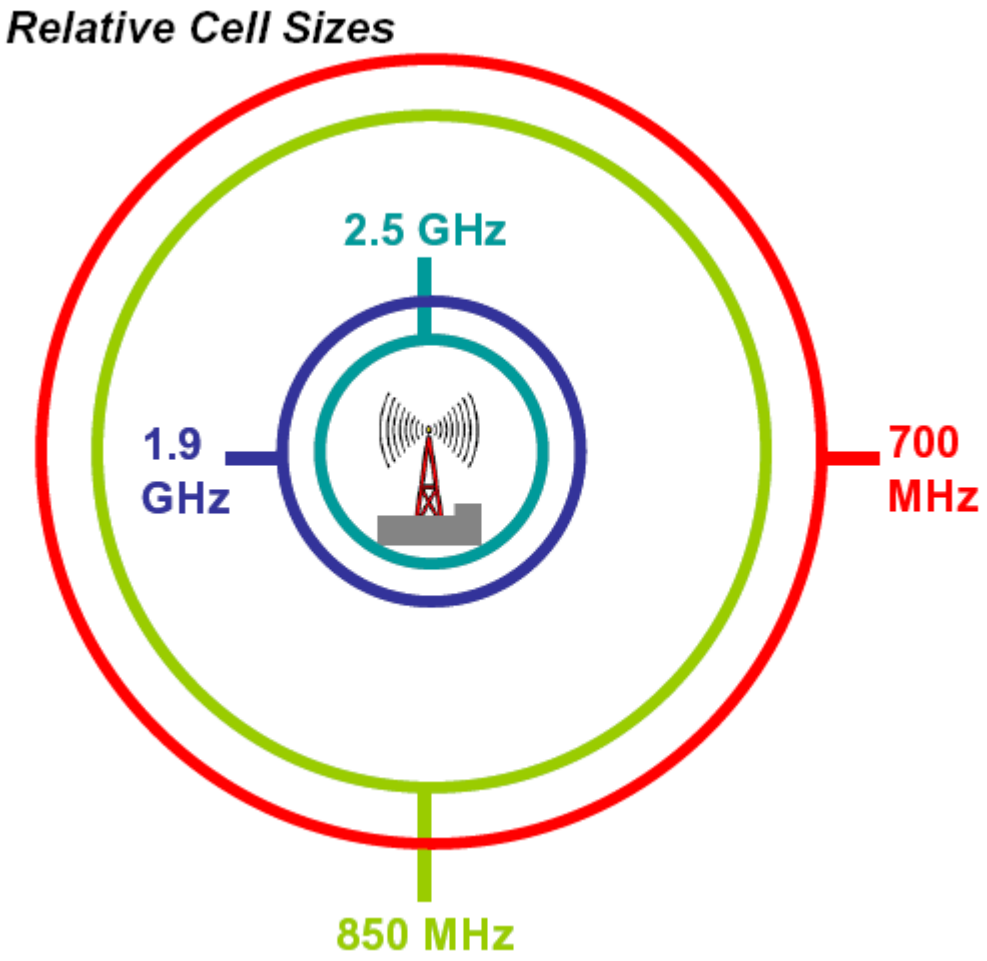

Figure ١: Relative cell site coverage range for different frequency bands

The coverage provided by each cell must overlap with coverage of neighboring cell, in order to ensure continues radio coverage and avoid any breaks in signal and allow user to use the service while traveling between cells to another with smooth handover.

Each radio station can only carry a relatively small number of calls or data services simultaneously, so additional BTS and radio resource needed to meet demand from users and especially in pick hours.

In order to deploy proper network and became operational a to provide acceptable service to user it needs proper frequency and capacity planning and find out number of BTSs required to meet demand of each area according to density of population. Each group of BTS must connect to Base Station Controller (BSC) through transmission links whether Microwave links or fiber.

BScs are connected to core network elements such as MSCs , HLRs, VLRs and all together with other parts of Authentication, Billing and IT parts in order to complete the network A-Z .

The figure ٢ below shows group of cell site BTS connected to BSC and BSCs connected to core element , it is posible to have ١٠s BSC in larg cities and many MSCs as well.

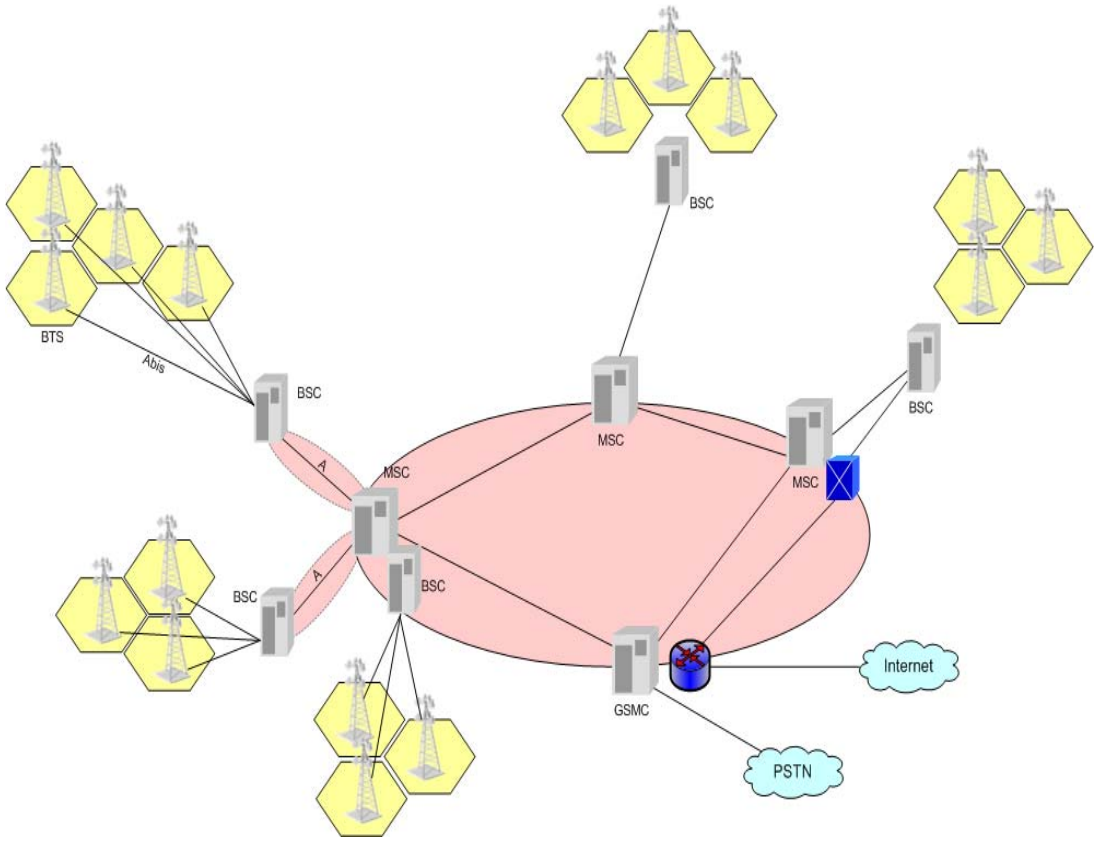

Figure ٢:Typical Wireless Networks

٢.٢ Classification of Wireless network infrastructure

Mainly, telecommunication infrastructure consists of two main parts, electronics components and non- electronics parts.

The electronics infrastructures referred to as active components while non- electronics infrastructures are referred to as inactive or passive components.

Base Transceiver Station, Antennas, Microwave radio links, Switches, Base Station Controller, IN and Billing System, IT equipment are electronics components and called active components.

Towers, Diesel Generators, Shelters, Battery sources, electrical power sources , Guard room, civil work foundation, premises and fuel storage are non- electronics and called passive infrastructure.

Active components	Passive components
Base Station	**Towers**
Microwaves Radio Link	**Shelters or Out Door Cabinet**
Switches	**Electrical Power Supply- DC System**
Antennas	**Generators & Fuel Tank**
Billing System & IT Components	**Land and Civil infrastructures**
HLR, VLR and Authentication system	**Guard House**

Table ١: Main components of Wireless Network

٢.٣ Essential Infrastructure for Wireless Cell site

simply,any telecommunication operators to provide proper telecommunication service to the users, it is must to construct and install many sites according to coverage and capacity plan required to meet population requirement and grade of service which offers.

Figure ٣ below, shows a typical green field GSM site which contain passive and active elements per single site for single operator if build site independently.

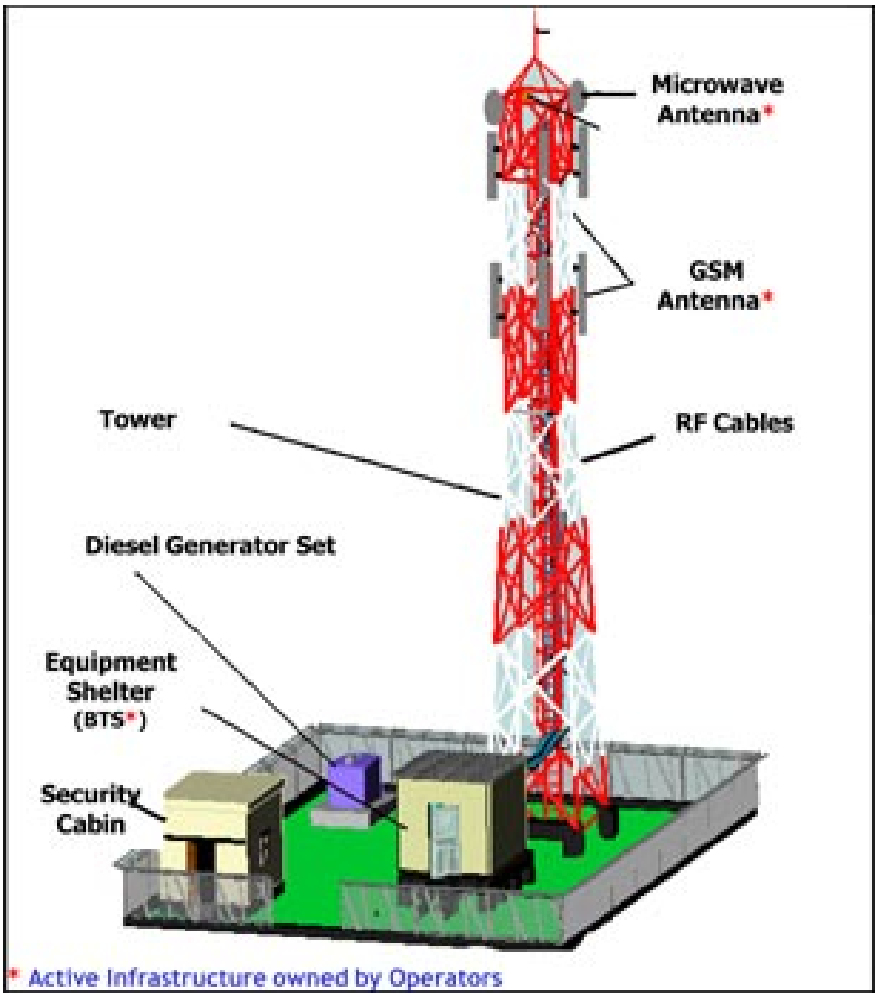

Figure ٣: typical green field GSM cell site

In general any telecom site can be classified in two major types, Green Field or Roof Top, the cost of construction is fluctuate between two types and depend of height and type of tower as well as on the size of equipment shelter and capacity size of diesel Generator.

Usually telecom service is ٢٤/٧ and ٣٦٥ days and it is required high ratio of availability, according to international standard availability of service preferred to be ٩٩.٩٥% or higher depend on regulatory QoS requirement. In order to achieve this grade of service , cell site must have reliable power source with backup power from AC and DC source, with secure environment to protected from sabotage and lifting.

Cost incurred in building such a cell site or similar is not negligible and take high ratio of CAPEX of any operators which estimated to be around ٦٠% of total cost of ownership, as well as OPEX cost will added on top of this cost apart of cost of main core network equipment.

٢.٤ CAPEX for Cell Site

As illustrated in (figure ٣) typical cell site consist of many valuable components as listed below:-

Tower to holds BTS antennas and MW antennas with different heightbetween (٣ m up ١٠٠m) depend on location and area and topology.

١- Shelters or cabinet to accommodate BTS, MW indoor unites, power system equipment, Batters and all other indoor equipment and the size depends of number of equipment and their dimensions.
٢- Air condition unites to provide stable temperature inside equipment shelter/cabinet to keep operation temperature meet equipment specifications. Capacity of A/C depends on heat dissipations of equipment and environmental nature of the area.
٣- Diesel Generator with fuel tank and capacity depend on power consumption of equipment and lighting.
٤- Domestic power supply and control board of change over switch.
٥- Guard house to keep site protected and ensure availability of services.
٦- Foundation and civil work to match load bearing of tower and equipment.
٧- BTS and antennas, transmission equipment including MW link and dishes, DC power and Batteries, power cable, fodder cables and installation materials.

According to current market price locally and internationally for reliable and durable equipment to enable operators to roll out its network are listed in the table below:

No.	Item Description	Cost in USD	Note
١	**Shelter cabinet, sandwich panel, well isolated(٢٥٠٠ L*٢٥٠٠ W*٢٨٠٠ H) mm**	**١٣٠٠٠**	**Price vary and depend on thickness of panel and source of supply**
٢	**Silent Diesel generator ٧٠ dBA, European engine and alternator range ٣٥ KVA, with ٢٠٠٠ L fuel tank**	**١٥٠٠٠**	**Price for different size vary %٢٠ more or less**
٣	**٤٠ M Green Field ٤ Leg lattice tower, galvanized steel, wind load speed Km/h**	**٣٠٠٠٠**	**Different height and deferent wind load speed has different price**
٤	**٢ set of split unite A/C ٢٤٠٠٠ BTU installation, automation , environment controller**	**٢٠٠٠**	**Cost vary depend on brand**
٥	**BTS S ٣/٣/٣ with ٣ panel antenna ١٢٠ degree with in installation kits**	**٥٠٠٠٠**	**Price per vender and per configuration will change**
٦	**PDH MW links with installation material for ٣٢ Mbps**	**٢٥٠٠٠**	**Price vary according to vender and size of the dish and capacity**
٧	**Cost of civil work for green field site including, concrete foundation, guard house and fence ,tower erection, electrical and generator installation, BTS & MW installation and configuration with cost of transportation,**	**٥٠٠٠٠**	**This price vary and depend of soil condition and tower height and construction size**
٨	**Site survey , site acquisition, legal document and permission without cost of land and rent**	**١٠٠٠٠**	

Table 2: estimated CAPEX of single operator Cell Site

From the table above we can find out CAPEX of one cell site is estimated about ١٩٥٠٠٠ USD, the cost of active component is only ٧٥٠٠٠ USD, but the rest is cost of passive element and cost of build and installation with is almost more than ٦٠%of total cost.

This figurehas been assumed here is more or less close to real market price and it can be used to estimate CAPEX and how it can be this amount hugely reduced if this case study be adopted.

 the above dada is estimated price and close to real price and it has been obtained for this purpose and it is not recommended to be used for commercial use.

٢.٥ OPEX for Cell Site

Another criteria which is not possible to be ignored is CAPEX, also this cost have notable value and based on the size of network and condition of the network , also it is vary from area to area.Reducing OPEX has significant consequence on net profit and it is highly considerable in telecommunication business and this cost must be reduced in a way does not effect on network quality and service.

In order to give you overall view of OPEX in telecommunication network, I will try to breakdown major cost in the table below, with estimated price to illustrate the burden on telecom operator in order to provide ٢٤/٧ service.

No	Service Description	Cost in USD/M	Notes
١	**Cost of rent of premises**	٥٠٠	**Cost depend on size of land and space also location and it is deferent for GF & RT**
٢	**Cost of Guard**	٣٠٠	**Number of guards depend on type and location of sites**
٣	**Cost of electricity (National Power)**	٢٠٠	**Cost depend on power load and consumption and availability also size of site**
٤	**Diesel for Generator ٣٥ KVA and runs ١٠ H/day**	١٣٠٠	**Calculated based on ٥ L/H and price of fuel ٠.٨ USD /L with transportation, this price may vary from location to location and season to season**
٥	**Diesel Generator maintenance, oil, filters and cleaning**	٢٠٠	**Cost based on twice change of oil and filters without major engine maintenance or repair**
٦	**Air-condition and power maintenance**	٥٠	**This cost to cover A/C cleaning and Gas refilling and power board maintenance**
٧	**Others costs for site cleaning and water for guard**	٥٠	**This cost cover some other cost which depend on site location and number of guards and water availability specially in GF**
٨	**Labor cost and transportation**	٥٠٠	**This cost vary depend on destination and number of labor involve in any operation**

Table ٢- Estimated OPEX for one Cell Site

The OPEX listed in the table above is excluded the cost of active elements such as BTS, MW links and feeders and antenna as well as RF optimization cost, it is only cover rent, guard salary, maintenance of electrical & A/C, routine maintenance of diesel generator which cover oil change every ١٥٠ hours, changing oil , diesel and air filter once, also cost of fuel supply based on fair quality of available fuel and oil in the local market and labor cost and transportation cost has been calculated based on company permanent employee not out source services.

The average cost per single operator cell site is around ٣٠٠٠ USD, more or less depend on the location of the site and situation of electricity availability. In fact this number is somehow very close to reality and can be used in this study to validate this case study and how OPEX can be optimized if this method applied.

Part ٣: The Idea of Infrastructure sharing and Advantages

٣.١ Infrastructure sharing ideology

In developing countries in particular, mobile telephony has been central in making services available to large sections of the population. However, much remains to be done to increase the penetration of mobile services, particularly in rural areas. The problem arises from the high cost of network infrastructure. This leads to high prices, as operators seek to recover their investment.

Sharing mobile infrastructure is an alternative that lowers the cost of network deployment, especially in rural areas or marginal markets. Mobile infrastructure sharing may also stimulate migration to new technologies and the deployment of mobile broadband. It may also enhance competition between mobile operators and service providers, when safeguards are used to prevent anti-competitive behavior.

There are two basic categories of mobile infrastructure sharing: passive and active. The former refers to the sharing of physical space, for example by buildings, sites and masts, where networks remain separate (see Figure). In active sharing, elements of the active layer of a mobile network are shared, such as antennas, entire base stations or even elements of the core

network. Active sharing includes mobile roaming, which allows an operator to make use of another's network in a place where it has no coverage or infrastructure of its own.

The assembly of passive equipment in one structure for mobile telecommunications is generally referred to as a "site". Agreements by one or more operators to put their equipment on the same structure such as a tower, a roof or a mast, is called "site sharing" or "collocation". Several elements of the passive infrastructure can be shared, as well as facilities such as the power supply and air conditioning. Antennas and transmission equipment might also be shared, but are considered to be part of the active (or transmission) infrastructure.

٣.٢ Whysharing infrastructure?

Many study and research has been done and still study under going about this important business, many criteria has been considered to find out a proper way to reduce investment and do not duplicate or even triplicate some investment in same area which has big impact on environment and landmark views, also to provide opportunity to fairer competition and ease burden on users for high bill of telecommunication service.

Bellow a detail of benefit behind sharing infrastructures ideology.

٣.٣ Benefits of Infrastructure sharing

٣.٣.١ Reduction of CAPEX

Telecom business is heavy on CAPEX, and as much as ٤٠-٦٠%of the CAPEX is utilized for setting up and managing the Telecom infrastructure (see table ١). With ARPU and Revenue per tower declining over time, sharing of Tower and other infrastructure is imminent. By sharing infrastructure, Operators can optimize their CAPEX, and focus on providing new and innovative services to their subscribers. In the long run, this is what will differentiate them from the competition.
In this case, multi operators ٢ or more can use same tower, same shelter, same landscape, same guard house and generators, more or less it is possible to share or reuse as much as possible of passive elements in same site and let we imagine if the CAPEX divided among ٢ or ٣ operators it mean each operator can save huge expenditure according to their utilization of the resource.

٣.٣.٢ Reduction ofOPEX

As it is has been mentioned in (table ٢) there are considerable cost of running , maintaining and managing equipment in each sites, by reducing responsibility of number of elements which has the day-to-day management inTelecommunication infrastructure and managed by single operator or outsource it to Infrastructure company,theOPEX costs are hugely can be reduced. The cost-savings can be used to increase the reach value, provide innovative services, and improve customer satisfaction, all of which will result in higher ARPU and net profit increase notably.

٣.٣.٣ Reduction Time tothe Market (TTM)

By leveraging existing Infrastructure that are deployed in active Telecom circles, a new operator can extremely cut down the time taken to begin operations. Sharing infrastructure can hugely support new deployment with eliminate site acquisition; build up time and hassles as well as previous operator RF survey can be advantage. The resulting savings in CAPEX can then be diverted towards Marketing and promotional activities which are crucial in the initial months. New operators can invest less and deploy faster as well as gain revenue quicker.

٣.٣.٤ Increasing Connectivity and Highest uptime

when any operator goes with infrastructure sharing idea and adopt this strategy, it is not only going to save the CAPEX and OPEX,it is also reduce or even eliminate hassle of operating in such conditions includes rural and remote locations which are characterized by erratic power supply, poor access road, difficult terrain and lack of adequate backup for power supply and Generators as well as fuel and other logistics.

The speed with which you roll-out the services ensures quick commencement of operations. Subsequently, the use of efficient processes and superior monitoring ensures minimum downtime for you. Having common infrastructure allow more back up and reliable resource to reduce downtime and better resource allocation for regular operation and maintenance are also able to penetrate new markets with ease. All these means, you have almost ١٠٠%uptime when you go with shared infrastructure.

٣.٣.٥ Cost and energy efficiencies

Sharing energy resources such as: Hybrid power solution, Diesel generator or solar panel, it is not only the matter of reducing CAPEX and OPEX for power generating source, it is also allows site owner to deliver reliable sourceswithwell-knownbrands and most up dated technology which it has highest efficiency with almost the same fuel cost and maintenance schedule, no matter this site serving one operator or more. In this case back up unites can be provided to increase reliability of system availability and it can prolong the life cycle of power system and allowssite ownerbetter time for proper maintenance.
Adopting green source of energies such as solar or hybrid can give more energy efficiency and reliability of supply , so this will result to significant reduction on OPEX and better environment which is turn to benefits to customer from different aspects.

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٣.٣.٦ Environment protection

This part it is one of the most important part and it is not only the matter of saving money and cost, it is saving environment and human life from pollution and noise as well as appearances of the landmarks views.

in the country like Iraq and our region in Kurdistan, almost Three licensed GSM operators and another Three CDMA and WiMaxlicensed operators (licensed by CMC), despite of few other operators for WiMax and other wireless broadband service. Let we consider five or three operators going to deploy services in any district or cluster in the city , for sure they need to build their own infrastructure in order to catch market and obey to license commitments with regards of roll out and coverage obligation. What will happen to our environment if five or three generators polluting our air and environment with noise and poisons gas emitted to air andfive or three tall towers in different size shape and color have erected?

In order to avoid this scenario to protect our environment and provide better chance for our population to live in safe and clean environment and to protect them from harmful effects from this industry.So, it is the biggest advantage for society and our environments to be protected by consisting to adopt this kind of project and force regulatory bodies to make legislation for it.

I think this is the minimum can be provided by business owner and government to offer to society by enforcing infrastructure sharing idea in Iraq and Kurdistan.

The photos below can clearly illustrate the different between shared and single operator owned infrastructure.

Figure Σ: each operators using own tower and infrastructure

With an easy actionwe are able tochanges the awful view above to nice and environment friendly views as shown below without any degradation on services which is require to deliver for customers.

Figure ٥: multi operators using single tower and infrastructure

Part ٤: Summery

Conclusion

The results obtained clearly supported propositions that operators can obtain up to ٥٠% savings on their CAPEX spending by deciding to share telecoms infrastructure with other operators. Also, the cost of power, maintenance and security was reduced by up to ٢٥%. Infrastructure sharing therefore promises to be critical lever in the growth of the telecom sector. By reducing these costs (i.e. CAPEX and OPEX), operators are able to extend their coverage to reach more subscribers, especially in remote areas. Not only is the cost of rollout reduced but also the time to rollout. Tower sharing also benefits the environment by reducing unnecessary duplication of masts and their associated infrastructure, thereby causing better city aesthetics.

Although infrastructure sharing has been known around the world since the year ٢٠٠٠, it was not until ٢٠٠٨ that telecom operators in many advanced countries got rid of the unwillingness to collocate by coming together to share masts. This collaboration has worked to their mutual benefit by making savings in both CAPEX and OPEX. Prior to that, marketing campaigns were even based on relative network coverage levels provided and operators were therefore unwilling to empower the other through co-location.

Infrastructure sharing may serve the Telecom industry well, especially in the face of the potential broad economic downturn by offering numerous potential business strategies.

At its best, Sharing will lower market-entry barriers by making it cheaper for new Telecom companies to enter the market and gain wide network coverage.

There is a growing recognition among operators that the rise of viable competition through co-location will force each operator to give of its best in service delivery. This has been intensified by the recent introduction of mobile number portability by CMC which allows subscribers to switch from one network to another while maintaining their number. This calls for high service quality, and telecom companies in Iraq and Kurdistan are well poised for this competition by engaging in infrastructure sharing which allows any operators to easily extend their network coverage to areas that are covered by their competitor.

Regulator (CMC) and ministry of Environment should continue to encourage infrastructure sharing by issuing the necessary policies to ensure the effective adoption and alignment by the competing operators.

The national communications and media commissionerregulator,CMC, has facilitated this co-location model in current licenses by permitting towers and infrastructure sharing. This has enabledsome telecom operators to engage in co-location and this has actually been beneficial to the engaging telecom companies by reducing their setup and operational costs.

Part ٥

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