THE ADVANTAGES OF THE GSM CONNECT SYSTEM AND ITS LOW POWER ACTIVE DAS NETWORK (v1.5)
compared with passive DAS and systems using NanoBTS or PICOCELLS.

-LOW OPERATING COST:

The system has an extremely low power consumption, and very low maintenance cost. It is completely built with standard building blocks, that are hot swappable and therefore very easy to service. The first level maintenance can be done by the local electrician. All this is reducing the total cost of ownership.

-EXTREMELY LOW SYSTEM RADIATION LEVELS WITH THE LOW POWER DAS:

The average 24/24h RF power on each indoor antenna is lower than 0dBm or 1 milliWatt while passive DAS systems tend to use powers between 1000 and 5000 milliWatts.

-TAILORMADE COVERAGE:

Small areas such as offices or rooms can be covered without overpowering other zones. This is not the case in a passive DAS system where high power is needed to compensate for the cable losses.

-UNLIMITED NUMBER OF CHANNELS:

The system is completely transparent and broadband, fully operator undependable with no limitations in number of communication channels, only the number of channels available from the local operators might be temporally limited based on traffic.

This is not the case if nanoBTS or PICOCELLS or FEMTOCELLS are used, where the number of available communication channels are always limited.

-5 FREQUENCY BAND SYSTEMS:

All 5 frequency bands 800 + 900 + 1800 + 2100 + 2600 MHz covering 2G, 3G and full 4G and 4.5G services are available.

This is not the case if nanoBTS or PICOCELS or FEMTOCELS are used, these are limited to one or two technologies and any new GSM technology needs extra infrastructure and cost.

-THE ADVANTAGE OF A 5-BAND SYSTEM:

5-band systems are particularly suited as the 800MHz band is extremely performing at bigger distance, while the 2600MHz band is very useful close to big cities where all other frequency bands tend to be overpopulated.

-FUTURE PROOF:

All built in amplifiers are 100% linear and suitable for any future technology like 4.5G or 5G without modifications or upgrades.

-FULL AUTOMATIC POWER AND COVERAGE ADJUSTMENT:

The complete system of a main amplifier followed by a Line extender provides a total signal gain of 80dB with a bidirectional AGC automatic gain control of 40dB. This means that the system amplification is automatically adjusted for optimum user comfort depending on the distance or modifications made to the operator antennas. Each frequency band of the system is automatically adjusted independently from the other frequency bands.

-EQUALIZER OF SIGNAL STRENGTH DIFFERENCES CREATED BY CABLE LOSS:

In addition to the automatic gain adjustment tending to reach the maximal signal level each frequency band can be set manually in order to compensate for the higher cable losses on higher frequency bands.

-LOW PIM (passive intermodulation) AND IMD.

Multiple RF signals together tend to create intermodulation distortion in both active and passive components when higher levels of power like in passive DAS systems are used. Such distortion can block temporally all communication in a whole frequency band. This is not the case with the GSM CONNECT low power system.

-GSM CONNECT in big buildings:

A low power active DAS system is specially suited for big buildings where the signal levels are going up and down based on propagation or the distance from users, while with passive or high power DAS systems occasional PIM distortion is difficult to avoid and extremely difficult to trace.

-BETTER S/N (signal to noise ratios)

Amplifiers that are located very close to indoor or outdoor antennas and that are used for uplink and downlink signals as in our system provide a much better signal quality. This is not the case with passive DAS systems where the uplink signals are strongly degraded due to long cables and passive splitters.

-EXTREMELY LOW OWN GSM RADIATION LEVEL:

Due to the active low power DAS system with the amplifiers close to the indoor antennas, each GSM equipment in the area needs only a very small transmit power to be able to connect to the terrestrial GSM network thus creating a much lower radiation level for all users, while also conserving a much longer battery autonomy for GSM or SMARTPHONE.

-HALOGEN FREE COAXIAL CABLING:

Active DAS systems can use low loss and highly flexible halogen free coaxial cabling.

-FLEXIBLE COAXIAL CABLING:

Due to the uplink amplification close to the indoor antennas of the active DAS system, a highly flexible easy to install coaxial cabling can be used that can reach easily any place in the building. Passive DAS systems need very rigid and thick cabling in order to keep the loss of signal low.

-EASY INSTALLATION:

The GSM CONNECT DAS system is easy to install, any cable installer can do it based on our instructions.

The main unit and the active splitters are 19inch rack mount or wall mount versions of a relatively small size fitting in small spaces. They are equipped with easy to monitor LED's or LCD display for each individual frequency band on the front panel. The Line Extender splitters can be installed as close as possible to the served indoor antennas and reduce cable length.

REMOTE MONITORING:

The GSM CONNECT system can be remote monitored and adjusted for the performance 24/24 and 7/7 , it generates error messages to the local manager or the installer if anything abnormal happens. The system keeps a log that can be consulted via the internet.

-MODULAR VERY EASY TO EXTEND SYSTEM:

The system is completely modular allowing to split the existing cabling at any place in order to create a new extension or new range of extensions. Systems can be extended to up to 256 indoor antennas. Passive DAS systems cannot be modified with new extensions, depending on required coverage they are limited to 10 up to maximum 20 indoor antennas.

-WEB ACCESS:

Web access with GUI (graphic user interface) allowing to monitor and manage the system is built in the main unit and can be made available in all extender units if useful.

-INTERFERENCE PROTECTION:

In the offered active DAS system each indoor antenna is connected directly to a series of filters blocking any unwanted signals to penetrate into the system, this in order to avoid any possible interferences from other indoor used radio equipment, this is not the case in a passive DAS system where any walky talky in the building can cause occasional and very difficult to trace PIM distortion.

FULL OPERATOR PROTECTION:

The GSM CONNECT system is the only product on the market with a series of full automatic security features that guarantee there cannot be any interference with the operator networks.

PERFORMANCE:

The GSM CONNECT system is the only product that is individually adjustable per frequency band and has a separate amplifier for each indoor antenna, this guarantees that even I-PHONE equipment will function satisfactory. I-PHONE equipment has a sensitivity versus the operator networks that is much lower than any other brand resulting in poor performance on passive DAS systems.

TRACEABILITY:

The GSM CONNECT active DAS system is not traceable by operators or authorities, making it extremely interesting for countries where limitations are existing due to operators claiming the exclusive rights for this kind of products.

Some references in the professional literature:

Mr. Morten Tolstrup in his instruction book "INDOOR RADIO PLANNING"

Disadvantages of passive DAS: https://books.google.be/books?id=ljSs8-bGyIIC&pg=PA135&lpg=PA135&dq=passive+das+disadvantages&source=bl&ots=8hkvQ7S3h_&sig=Tj3ZnmuyklPRje-NaHh2_BhPFH0&hl=nl&sa=X&ei=wzKEVdbiBcbdUffyjKgN&ved=0CCAQ6AEwAg#v=onepage&q=passive%20das%20disadvantages&f=false

-there is no surveillance of errors in the system

-it is not flexible for upgrades

-cable losses degrade data performance

-it is hard to get a uniform coverage level

-it requires high power base stations

-expensive installation of rigid cables.

Advantages of active DAS:

https://books.google.be/books?id=ljSs8-bGylIC&pg=PA158&lpg=PA158&dq=active+das+advantages&source=bl&ots=8hkvQ7Sam0&sig=Ej4Zb8nMoHQNYGeEgaEpX2pfFb0&hl=nl&sa=X&ei=sjWEVaLINcryUL_DgeAJ&ved=0CCcQ6AEwAw#v=onepage&q=active%20das%20advantages&f=false

-ease of installation but more expensive.

-better downlink

-better s/n on uplink

-perfect choice for 3G HSPA and 4G LTE

-low radiation

-suitable for longer cable distances up to 300m

Mobile design magazine:

http://mobiledevdesign.com/learning-resources/distributed-antenna-systems-deliver-lte-success

Passive Systems

Passive systems use thick coaxial cable (0.5 to 1 in. in diameter) to distribute the wireless signal. The main distribution unit is connected to the signal source, and then the unit drives the signal over the coaxial cable. The coaxial cable used to distribute radio signals is inherently capable of supporting multiple carrier frequencies. While passive systems are thereby viewed as simpler, one-stop solutions for indoor wireless coverage, there is also a great risk of signal interference, and multiple bands may “mix” and produce noise on the network.

In a passive system, the signal degrades with the length of the cable in any particular run. As a result, passive systems are not well suited to large facilities with long or complex cable runs or to facilities that require high call capacity or high signal strength. Even in a relatively small deployment with as few as 16 antennas, users may need to stand very close to the antenna to get a good signal. Signal quality degrades the farther the cable is from the RF source.

Passive systems do not offer end-to-end monitoring and management. The signal is simply being pushed out over copper cabling, so service providers and building owners never know if a particular antenna has failed until users start complaining.

Finally, passive systems are more difficult and expensive to install, because their heavy and rigid cabling requires special expertise and often special cable raceways or hangers. Since the cabling is not as flexible, it is also more difficult to deploy in tight spaces.

Active systems:

Because the signal is amplified at the RAU’s, there is no end-to-end signal loss. Active distributed antenna systems deliver strong and consistent signals at every antenna, no matter how far away they are from the signal source and main hub, making them easy to design and the user experience consistent. In the largest airports and multi-facility deployments such as major hotels on the Las Vegas strip, some active distributed antenna systems extend for miles. Since every antenna has

predictable signal strength and coverage, it is far easier to plan the antenna placement in an active system.

The distributed hub architecture of an active system mirrors the design of Ethernet LANs. It scales easily through the addition of new antennas and hubs, and the hub electronics can be upgraded to support new services as they come online. This leaves the most expensive part of the system, the cabling and antenna plant, untouched. Active systems usually support simple network management protocol (SNMP) alarms as well, so a company's IT staff can monitor the status of all remote antennas in the network using the same network management tools used for the LAN.

Active DAS can be less expensive and are less disruptive to deploy because their standard cabling is inexpensive, and the job can be handled by IT cabling contractors or electricians rather than specialized technicians. Standard cabling can be run across suspended ceilings and in tight spaces like conduit just as easily as LAN cabling. In many cases, an active system can use existing, unused fiber that runs up a multistory building's utility riser to link a main hub with expansion hubs and then use new CATV cabling to connect each expansion hub to its RAUs and antennas. While multiple sets of electronics may be required to support all service providers (depending on the service providers' requirements), the cost of cable runs is a larger factor in the overall price of a system in all but the smallest facilities. Active distributed antenna systems minimize this cost.