



[Hosted Data Center]

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Wateen Telecom (Pvt.) Ltd.

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INTRODUCTION

MANAGED SERVICES AND SOLUTIONS

TELEHOUSING AND CO-LOCATION FACILITIES

WATEEN Telecom's international standard Telehousing Facilities provide Tier-1 quality service to customers 24/7, 365 days a year. These "Telecom Hotels" provide locations regionally to install and operate infrastructure to telecom and media companies, corporates and other end users based on industry leading SLAs.

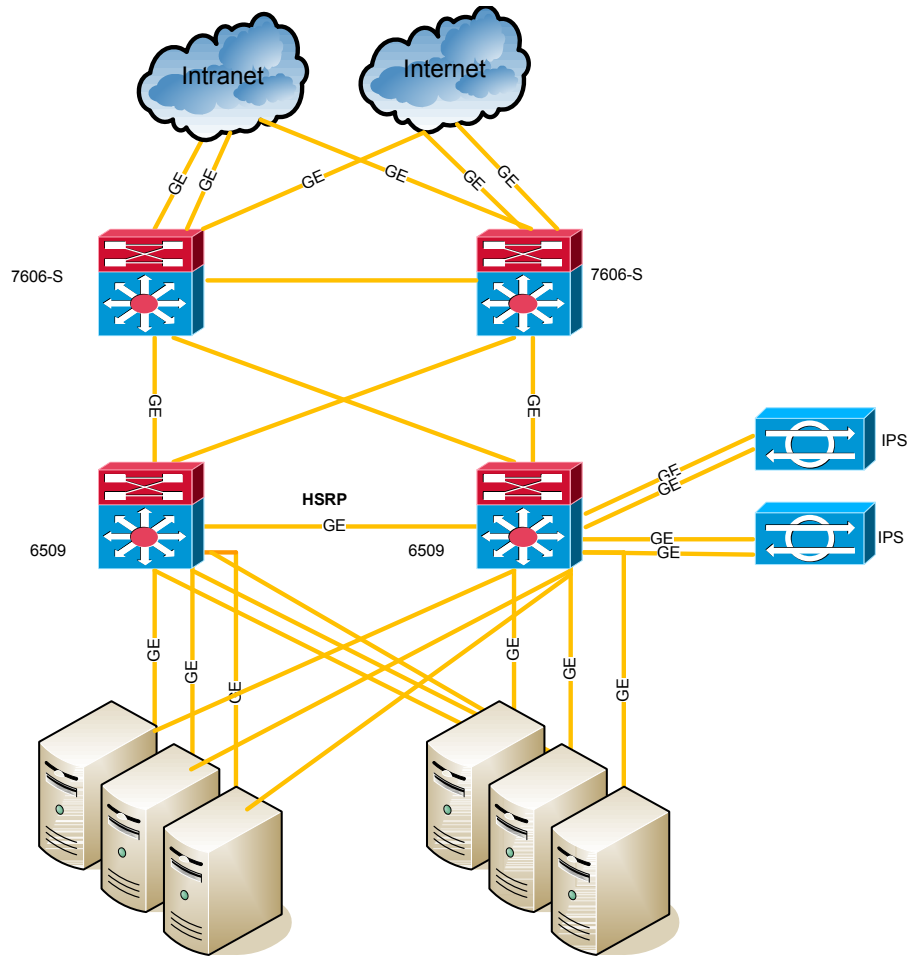
DATA CENTER HOSTING AND DATA WAREHOUSING

WATEEN Telecom's Data Center Hosting and Data Warehousing services allow customers affordable and secure remote data services, secure data ware-housing and disaster recovery solutions leveraging WATEEN Telecom's entire carrier grade infrastructure. WATEEN Telecom has established the first of its kind Tier III (N+1) Data Center Facility in the Country.

DATA CENTER NETWORK LAYER (SWITCHING & ROUTING)

Cisco 7606-S is connected with intranet and Internet on GE links. There is dual uplink connectivity with the intranet and redundancy is achieved by using TE of MPLS. Cat6500 has 6724 card and is used for dual connectivity with 7606. HSRP is used for redundant connectivity between core switches and core routers. The main goal of the core layer is to switch traffic at very high speed between the modules of the network.

For server connectivity, we have collapsed core where servers are directly connected on the core switches. Server redundancy is achieved by having dual NIC connected in V shape with the core switches. Layer 2 is extended to aggregation layer as services layer require layer 2 connectivity. OSPF is being used between the core routers and PEs and equal cost path of both sides of core switches is advertised to the intranet to have proper load balancing.



Spanning tree is used to avoid loops in case of any closed circuit. By using these technologies one can control the Layer 2 topology from accidental or malicious changes that could alter the normal functioning of the network

Several security services are available to protect the content within a data center and to control and secure the access to the business applications in a server farm. A secure design can help ensure that attacks are not carried out by external client machines from over the Internet, or by internal server machines that become infected and try and become agents for other attacks.

Access control lists, firewalls, and host-based intrusion prevention systems (IPSs) have been implemented in combination with NetFlow detection systems to mitigate vulnerability and assure resilience against external and internal threats.

BENEFITS OF PARTNERING WITH WATEEN FOR HOSTED DATA CENTER SERVICES

FOCUS ON CORE BUSINESS

With WATEEN's Hosted Data Center services, the customer can off load its data center needs to WATEEN Telecom, while retaining the business logic and direct control in-house. This will enable the customer to focus on its core competencies

LOWER TCO (TOTAL COST OF OWNERSHIP)

Instead of investing in capital equipment, staffing and in-house operations, the customer can take advantage of advanced applications through managed services and continue to focus on core activities. The technology is owned and managed by WATEEN Telecom, and is therefore constantly updated and maintained at the network level, saving the customer many of the costs and risks associated with technology aging, upgrades, patches and technical staff. Compared to premise-based solutions, managed services will lower TCO by reducing hardware and software costs, saving floor space and leveraging the cost-efficiencies and economies of scale associated with set up, training, maintenance and upgrades.

Apart of the above mentioned clear cut advantages, following are few more compelling reasons for the Customer to avail WATEEN's Hosted Data Center Services.

- Large cost savings since WATEEN will be providing all the converged services entirely through its own network; passing the cost savings to the customer.
- WATEEN's own Long Haul and Metro Rings that are capable of supporting very high data rate will provide end to end virtual circuits on its own network which is fully secure.
- A one window operation for all internet, voice and data related issues.
- WATEEN's ability to guarantee QoS and enter into SLAs since WATEEN will be offering end to end solutions using entirely its own network.

PHYSICAL DESIGN CRITERIA OF THE DATA CENTER

Present-day information technology hardware is designed and manufactured with the highest levels of reliability possible; provided the equipment is installed and operated in a suitable surrounding and the facility requirements are fulfilled. In other words, any IT site and support infrastructure must be adequate and well-maintained. Inadequate or degraded infrastructures can impact hardware and system availability, and have an overall negative impact on productivity and performance. Design criteria considered the following:

- **Site selection**
- **Exposure to Flooding**
- **Ground water**
- **Severe weather conditions / Storm & tempest**
- **Earthquake**
- **Social Hazards**
- **Reliability of public (security) services**
- **Industrial Risk**
- **Utility failure**
- **Environmental Pollution**
- **Data Center Design**

The approach is designed to be Scalable Modular within the given 1,550 square feet of raised floor areas as well as for non raised floor areas which have been allocated for housing other building services and facilities.

The design incorporates fire rating specifications and implementation is in accordance with the standards and specifications. Appropriate floor, ceiling and doors, walls structure will be utilized for meeting the fire and safety standards.

Usual fire rating is F90 / T90 or higher

POWER DISTRIBUTION

GROUNDING AND LIGHTNING PROTECTION

IT equipment is connected to the grounding bus bar in the branch-circuit distribution panel by an equipment-grounding conductor. This grounding bus bar is connected back to the service entrance building ground by an equipment- grounding wire.

TRANSIENT GROUNDING

To minimize the effects of high-frequency electrical noise, the branch circuit power panel servicing the equipment are mounted in contact with bare building steel or connected to it by a short length of cable.

The raised floor supporting substructure is also used as a substitute for the transient plate

MEDIUM VOLTAGE SYSTEMS

There is a dedicated power supply structure implemented serving the IT facility, exclusively from utility hook up through to the individual consumers.

TRANSFORMERS

Transformers are planned with regard to current and future demands. With regard to the IT facility, there is at least a 100% redundancy realised.

Transformers are mounted in separate cells; fire rating of transformer cells is at least F90, T90.

LOW VOLTAGE SYSTEMS AND SWITCH GEARS

There is an automatic transfer switching in the main distribution, switching between multiple (redundant) transformers and multiple (2) feeds to each UPS with automatic transfer switches before and after the UPS systems.

POWER DISTRIBUTION UNITS AND BUSBAR SYSTEMS

Power distribution units and / or bus bar systems are planned with regard to current and future demands. Multiple power feeds to the distribution units or bus bar systems will be available from separate power sources.

Emergency Power Off (EPO) is split between IT equipment and HVAC equipment, clearly marked and situated next to each door of the specific room. It is protected from erroneous activation but easy and quick to operate.

UPS SYSTEMS

A combination of an engine driven generator and an UPS system consisting of a static converter with continuously loaded batteries is the usual method being implemented in data centers to supply power during short and long outages.

Battery capacity is calculated according to power and autonomy requirements.

UPS system allows for modular expansion.

Harmonic content is maintained at less than 5 %, at all conditions, especially during change from normal to UPS power.

Phase shift of IT equipment: typically $\cos \Phi = 0,8 - 0,95$ inductive load is compensated.

Line-to-line imbalance is less than 20%.

WATEEN Telecom has provided the power generating equipment accordingly.

The back up generator system is construed self-sufficiently with their own starter battery as well as control system battery and automatically self-starting in the event of power failures. Fuel tanks for at least 24 hours of operation are provided.

NETWORK AND CABLING INFRASTRUCTURE

Considering WATEEN Telecom's inherent capability of being a network services provider in the country, the Data Center design makes provisions for complete Network Operations Center within the Data Center. The Data Center design provides for both air and land based routes for wireless, fiber and copper carriers to access the Data Center. This will include growth capacity for future Warid group needs.

The telecommunication infrastructure (LAN cabling) within an IT facility provides for highly performing, highly available and highly reliable data transmission between servers, operations and WAN equipment.

To facilitate the above requirements, the cabling is able to support current and future applications as defined in the ISO 11801 2nd Edition.

With respect to this, the LAN cabling is a mix of media (Fiber optic cabling as well as copper cabling).

Fiber optic cabling is be either single mode or multi mode using OM3 (modal bandwidth > 500 MHz*km @ 850 nm) fibers in order to allow for high frequency transmission over acceptable lengths.

Copper cabling is Class E (Cat. 6) according to the standard. In order to facilitate 10 GBit Ethernet over copper, the system is a shielded system, maintaining 360 degree shielding over the entire link / channel and implemented according to the reference implementation model of the ISO 11801.

ENVIRONMENTAL CONTROLS

The air conditioning system provides year-round temperature and humidity control as a result of the heat dissipated during equipment operation.

Most IT equipment is air-cooled by internal blowers. Most machines are designed for updraft airflow. Separate, redundant air conditioning systems are used for data rooms and technical areas.

TEMPERATURE AND HUMIDITY DESIGN CRITERIA

The IT equipment can tolerate a considerable range of temperature and humidity, as usually described on the specifications page in the planning manual for each machine. Generally, the air conditioning system is designed for 22 degree C and 45% relative humidity at altitudes up to 2150 m. Air conditioning control instruments respond to +/- 1 degree C temperature and +/- 5% relative humidity are installed.

| | Design Criteria |
|--------------------------|------------------------|
| Temperature | 22.0°C |
| Relative Humidity | 45% |
| Maximum Wet Bulb | 23.0°C |

SYSTEM AIR DISTRIBUTION

Careful attention has been given to the method of air distribution to eliminate areas of excessive air motion and hot spots.

AIR FLOW CONSIDERATIONS FOR RACKS

Air flow is critical for ensuring the operating air temperature stays within permissible limits:

- Air flow direction of all installed components in a rack is in the same direction (e.g. from front to back) to prevent warm air recirculation problems
- Populating the rack starts with the bottom and works up towards the top of the rack.
- Any unused rack space is covered with a blank rack filler panel to ensure proper air circulation.
- When racks are positioned adjacent to each other, it is ensured that the racks fit tightly together from side to side to prevent inter-rack air recirculation from the back to the front.
- Air recirculation occurs over the top or around the side of a rack in a room that does not have a cooling system with sufficient airflow volume capacity. It is ensured that the cooling system has adequate capacity for the room cooling load.

UNDER FLOOR AIR DISTRIBUTION

In under floor air distribution, the space between the regular building floor and the raised floor is used as a means to supply air for equipment cooling.

Concrete sub floors are treated to prevent the release of dust. Air is discharged into the room through perforated panel floor registers. The air is returned directly to the air conditioning system or by means of a ceiling return system.

AIR FILTRATION

A high efficiency filter, rated according to the mechanical or electrostatic filter specifications described below, is installed to filter all air supplied to the computer room. Ratings are determined by using the test methods outlined in the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standard No. 52-76 (or national equivalent).

SECURITY

PHYSICAL AND LOGICAL SECURITY

Smoke and Fire alarm systems including Very Early Smoke Detection Systems

For the data centre and technical rooms, cross zone smoke detection is used to trigger the fire alarm system. The building fire alarm system also annunciate in the data centre. Automatic fire detectors are installed in

- IT Rooms
- Technical rooms
- Aisles
- Raised floors
- Suspended ceilings

GAS EXTINGUISHING SYSTEM

Gas extinguishing systems are used in IT facilities, a ventilation system should be available for the removal of discharged extinguishing gas and combustion products and procedures are established for venting the area after a gas discharge.

Halocarbons, used as fire extinguishing gases, have zero Ozone Depletion Potential (ODP) as well as a low Global Warming Potential (GWP) and a low atmospheric lifetime.

VERY EARLY SMOKE DETECTION SYSTEMS

Fire risks are minimized by the installation of this often installed and mature sensor technology available for many years.

Active sensors reliably detect particles released by overheating and smouldering of isolated cables or plastic materials, boards etc. Thereupon a defined alarming and specific preventive measures are released.

INTRUSION (BURGLAR) ALARM SYSTEMS

All doors into the Data Center facility are equipped with intrusion alarm devices according to the prevailing building code.

Facades and glazed building components are also be equipped with intrusion detection devices (e.g. opening and glass breakage detectors) referring to the prevailing building code.

Outside protective devices are installed (e.g. fences with IR and / or microwave perimeter control, guarded area).

Alarms are forwarded to guards and / or security forces, i.e. to the next police station.

ACCESS CONTROL SYSTEMS (CCAS)

There is a computer controlled access system installed. The admission authorization is given according to a defined zone concept. The system records and logs all access attempts.

VIDEO SURVEILLANCE SYSTEMS (CCTV)

CCTV security cameras are installed at the

- Exterior of the building
- Lobby Area
- Data Centre
- MEP areas
- Interior Aisles

The system is controlled centrally by a security guard or at least in the IT operations department by a dedicated person. The video cameras record on a VCR or Digital or CD-ROM.

WATER LEAKAGE DETECTION SYSTEMS

There is water sensors mounted in the raised floor near every air-conditioning device, connected to the microprocessor control unit of the respective air-conditioning device and to the BMS (Building Management System). Along the water-leading pipes, warning tapes are to be installed and connected to the BMS as well.

In general, attention is paid to the fact that no water leading conduits are installed within IT rooms.

Security is essential, not only for WATEEN Telecom’s own resources, but for providing a comfortable position for WATEEN Telecom’s customers accessing the Data Center. Both elements of security, that is physical perimeter and logical access to data is critical to be controlled, logged and verifiable.

WATEEN HOSTED DATA CENTER EQUIPMENT DETAILS

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| CRACs Precision cooling (Items) |
| 20 Tons down flow for server rooms - Model Stulz ASD 702 |
| 2 Tons wall mount front flow for offices - Model LG comfort AC |
| Water detection, control feeds, humidity control |
| Conduiting for CRACs, commissioning |
| Condensers, drainage, control feeds cabling |
| Piping Moeller Germany, R407C charging |
| Electrical Distribution, wiring, conduiting |
| MG/GE MCBs, Telemecanique Relays, H05RN7 cables |
| DB Panel server room |
| DB Panel LAB and systems operations area |
| DB Panel NOC and Systems Administration area |
| DB Panels other areas on UPS |
| Bus bar systems, switching, circuits control feeds |
| Grounding, Earth systems, ELCBs |

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| UPS capacity |
| 300 KVA 3 phase for Data Center |
| Model MGE Galaxy 6000 10 minutes backup standard |
| Synchronization, control feeds |
| Raised floor area |
| Model Bergvik ISO NEBS 0 600 x 600mm, 400mm H |
| EMI controls, grounding |
| Security and Access control |
| Axis 206 Network indoor cameras Server room |
| Axis 206 Network cameras LAB and Operations area |
| Axis 206 Network cameras NOC and Systems Admin area |
| Axis 215 PTZ Surveillance Cameras Entrances to IT areas |
| Complete with NVR software |
| Access biometrics server room |
| Access Cards swipes entrances, NOC, LAB, Main |
| Honeywell Biometric and proximity readers |
| Honeywell NS2 kit with software and accessories |
| Emergency exits bars |

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| Alarms systems (sirens) |
| Fire Detection systems |
| Server area 4 zones smoke, optical detectors |
| Monitoring areas 4 zones detectors |
| Kilsen GE Spain Ionization Optical/Smoke detectors |
| Alarm systems (hooters, bells) |
| Fire Control Systems |
| Server area 4 zones gas injectors |
| FM200 Gas and 200 liters Cylinders |
| Cylinder Hygood UK, Gas USA, |
| Portable CO2 Extinguishers |
| Voice and Data Cabling IT areas, conduiting |
| Fiber interconnects SC LC Multimode Systimax |
| Fiber backbones SC LC Multimode Systimax |
| Cat6 Data and Voice UTP Systimax |
| Patch panels 24 ports Systimax |
| Patching cords Systimax |
| Cable trays 18 SWG GI |

DESIGN LAYOUT OF THE DATA CENTER

WATEEN Telecom Hosted Data Center is located at Aitchison Colony, Near Thokar Niaz Baig, Lahore, where a capacity of more than 3,000 square feet of floor space is allocated.

The layouts for the conceptual Data Center is described below, with 1,554 square feet of space to be allocated for IT Servers room and the rest divided into two areas of 714 and 520 square feet respectively to be allocated for housing Systems management room and Offices of the Data Center.

Floor layout and racking plan
 Raised floor 37 x 42 = 1554 sqr ft
 Sunken below plinth level

