TATA COMMUNICATIONS

Energy Conservation
- Best Practices in IDC

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TATA

Global Footprint of Colocation and Hosting Facilities

Worldwide DC Capacities – A Snapshot

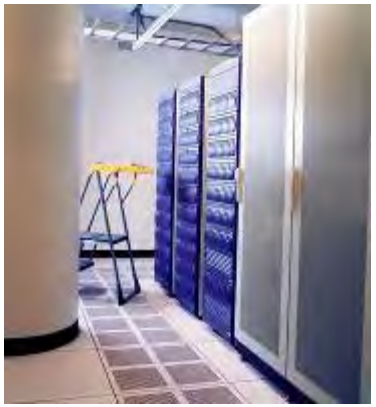
REGION	AVAILABLE CAPACITY (NO. OF RACKS)	AVAILABLE CAPACITIES (NO. OF RACKS) As on 31st Dec 2009
ASIA	2700	6000
EUROPE	600	1000
AMERICAS	400	700
AFRICA	300	600

Key Investments and New Footprints Planned

- **Singapore** (2010)
  - New Data Center announced in Singapore (~ 1800 racks)
- **London** (2009)
  - New Data Center announced in London (~ 700 racks)
- **South Africa**
  - Engaged with NeoTel to extend Data Center Services in South Africa (~ 600 racks)

EC Opportunities in a Service Provider's Data Center

- **Multi-tenant Customers with different Compute Power Requirements**
- **Co – existence of multiple sub data centers**
  - Test Lab Data Center
  - Enterprise Data Center
  - Hosting Service Data Center
  - Web Hosting Services Data Center
  - Carrier / Telecom Data Center

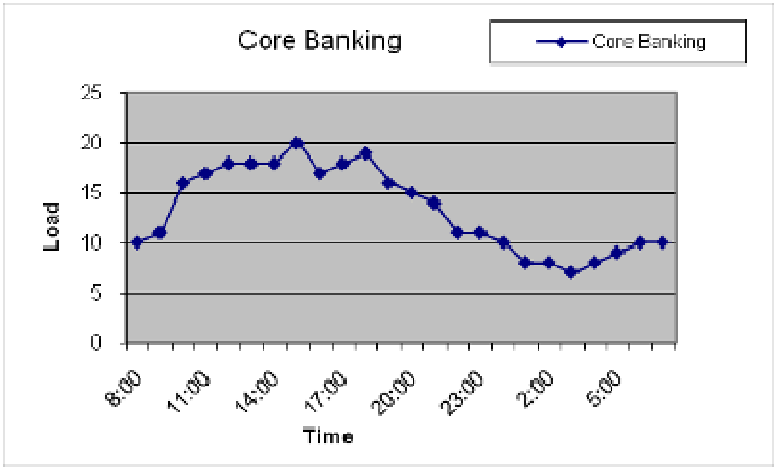


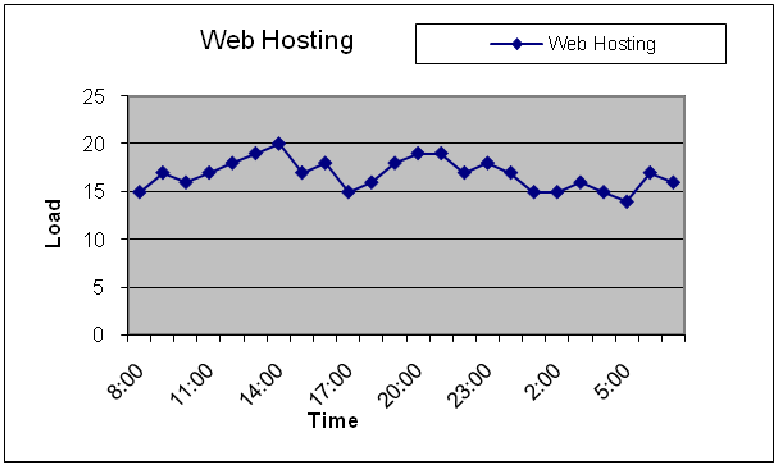
- **Opportunities to Optimize for Tata Communications –**
  - Optimize the facilities in its earlier designed Data centers (20% of total DC capacity)
  - Implement the learning in Newly designed Data Centers (60% of total DC capacity)
  - Further Optimize in Future Data centers (20% of total dc capacity)
- **Need to Balance the Data center Environment for**
  - Energy Conservation
  - Cost Savings

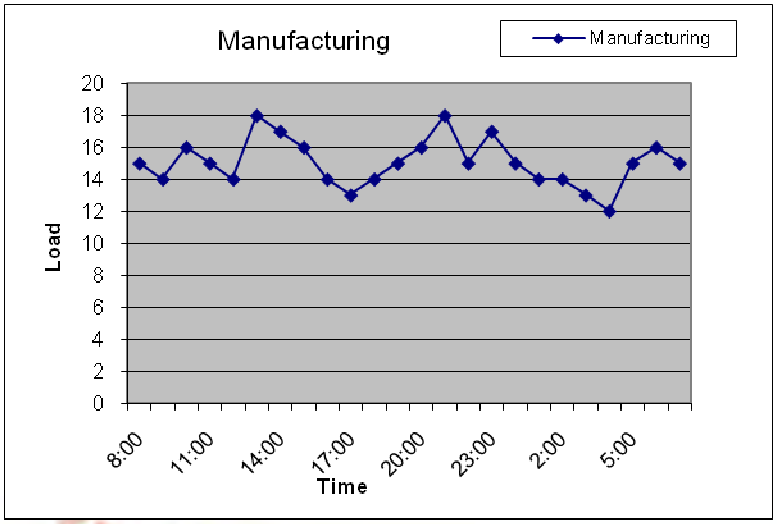
Energy Conservation Initiatives

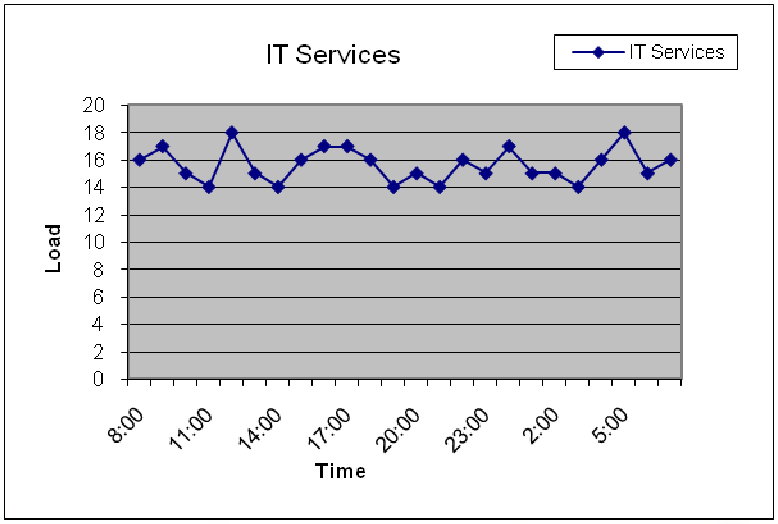
- Zoning of data center as per IT equipment load profile
- Adopting best maintenance practices
- Energy efficient designs for New Build

Load Profile for Various Customers Group Compute Load



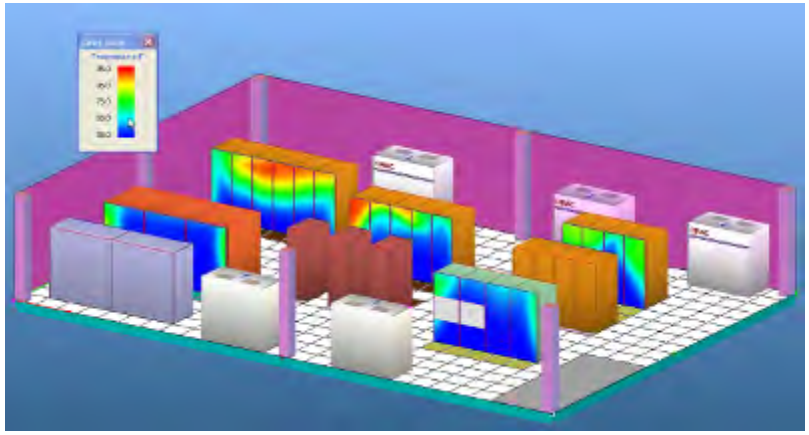






Optimization Measures

- **Study the customer equipment specification before placing in to server room**
- **Load profile study of individual sectoral customer**
- **Zoning of data center as per customer load profile**
- **Setting adequate airflow as per load profile**
  - Selection on number of grills based on load demand
  - Providing grills with dampers
- **Microprocessor based control for crack units based on heat load demand**
- **Optimization of cooling load in proportion with server load profile**
  - Thermal profiling image



Energy Conservation Initiative

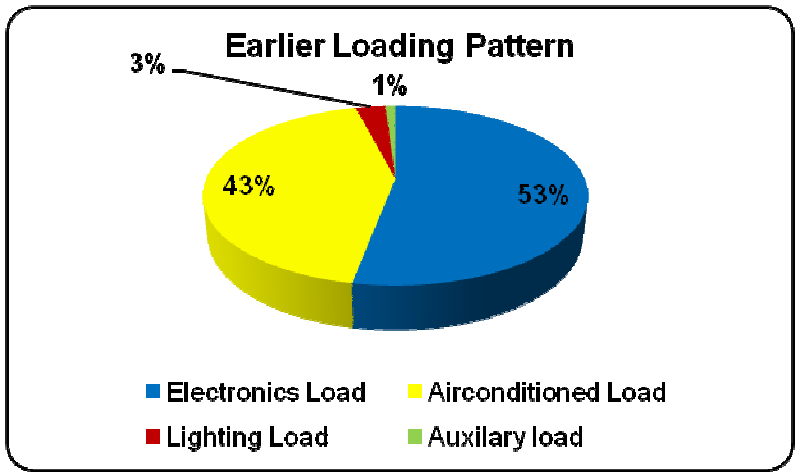
- **Maintenance Practices**
  - Power quality Audit confirming EN 50160, harmonics analysis as per IEEE 519
  - InfraRed thermography of equipments
  - Effective utilization of IBMS system to monitor and control power & cooling equipment
  - Assessment of refrigeration capacity and air balancing
- **Power System**
  - Limiting current harmonic distortion using Passive & Active filters
  - UPS PF compensation for reduction in total power demand
  - Effective reactive power compensation using APFC
  - Balance loading on three phases to reduce distribution losses
  - Installation of occupancy sensors to control lighting ON / OFF

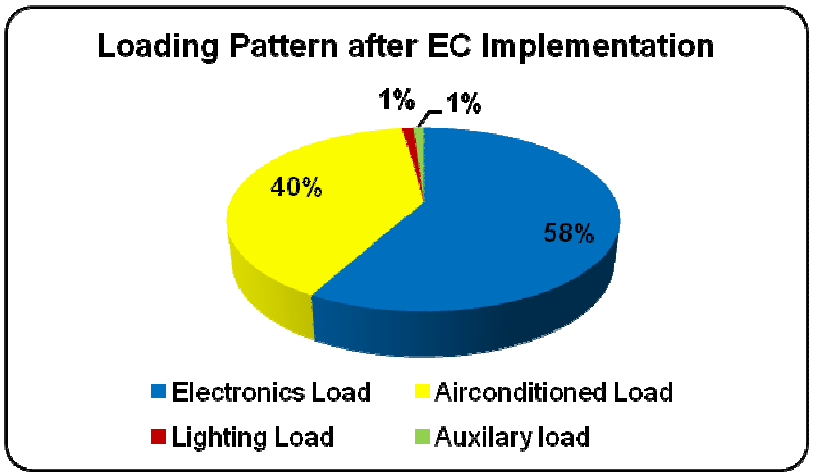
Energy Conservation Initiative……. Contd.,

- **Cooling System**
  - Adopting variable air volume system
  - Optimizing lighting load in air conditioned area
  - Adoption of roof & floor insulation, false ceiling to minimize refrigeration load
  - Use of softened water in condenser
  - Controlling cooling tower fans based on leaving water temperature

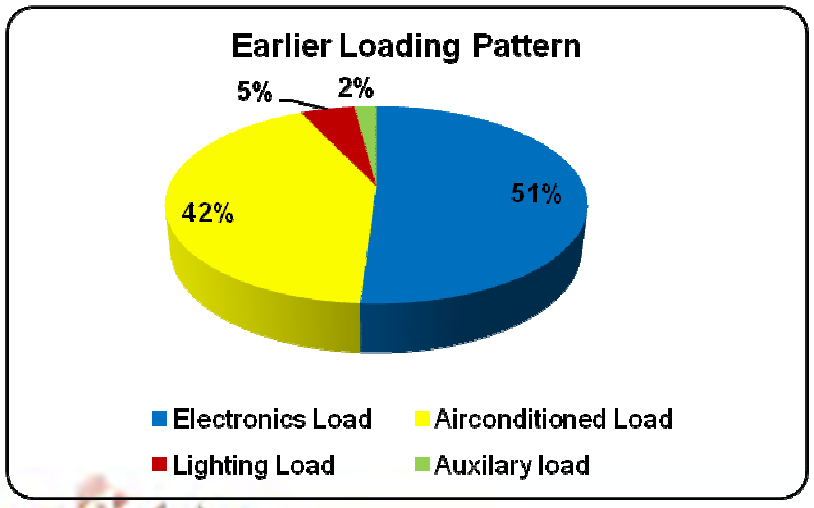
Loading Pattern – Before and After Energy Conservation Implementation

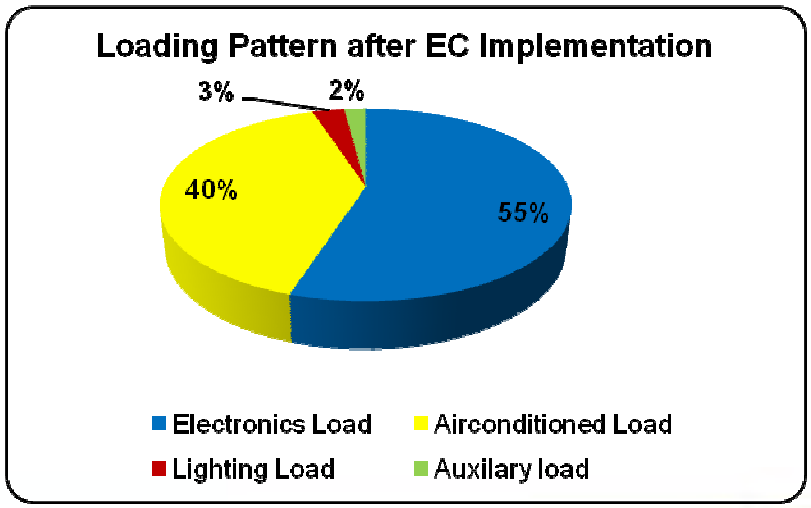
Mumbai





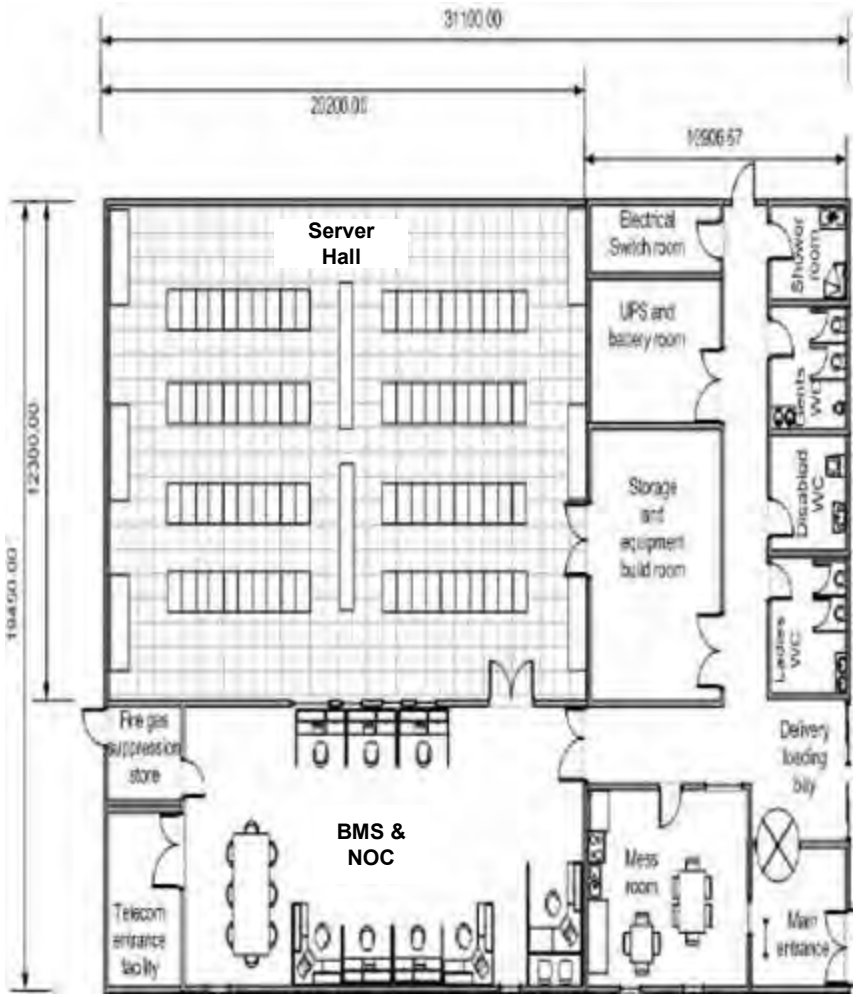
Hyderabad





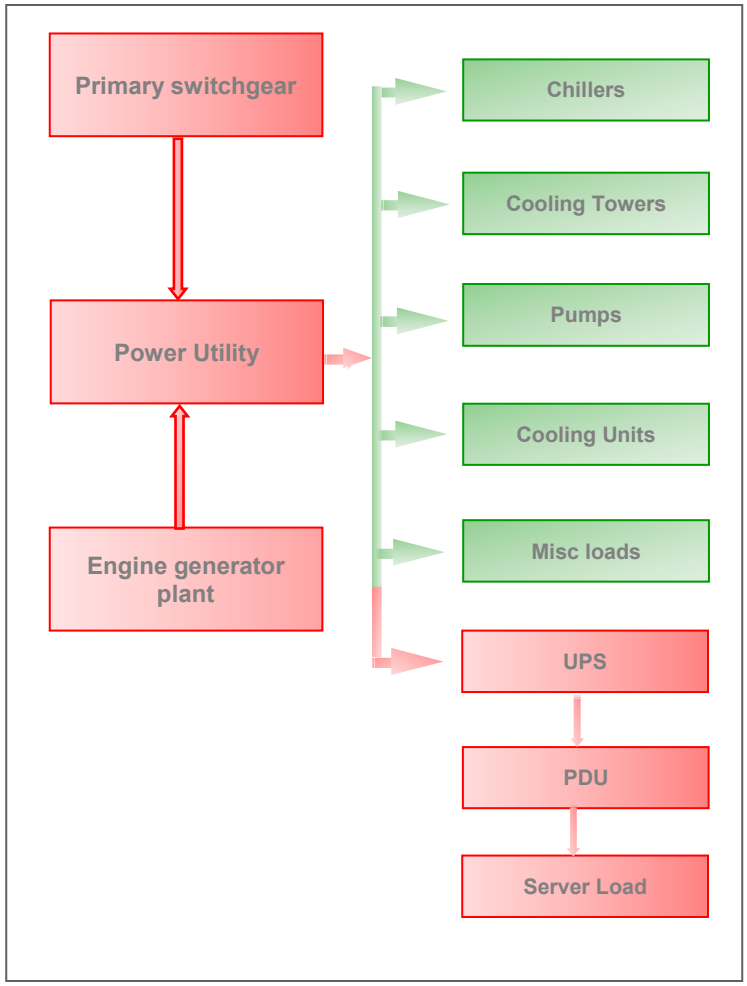
Net Saving in power consumption observed is 8-10%

Standard Data Center Layout



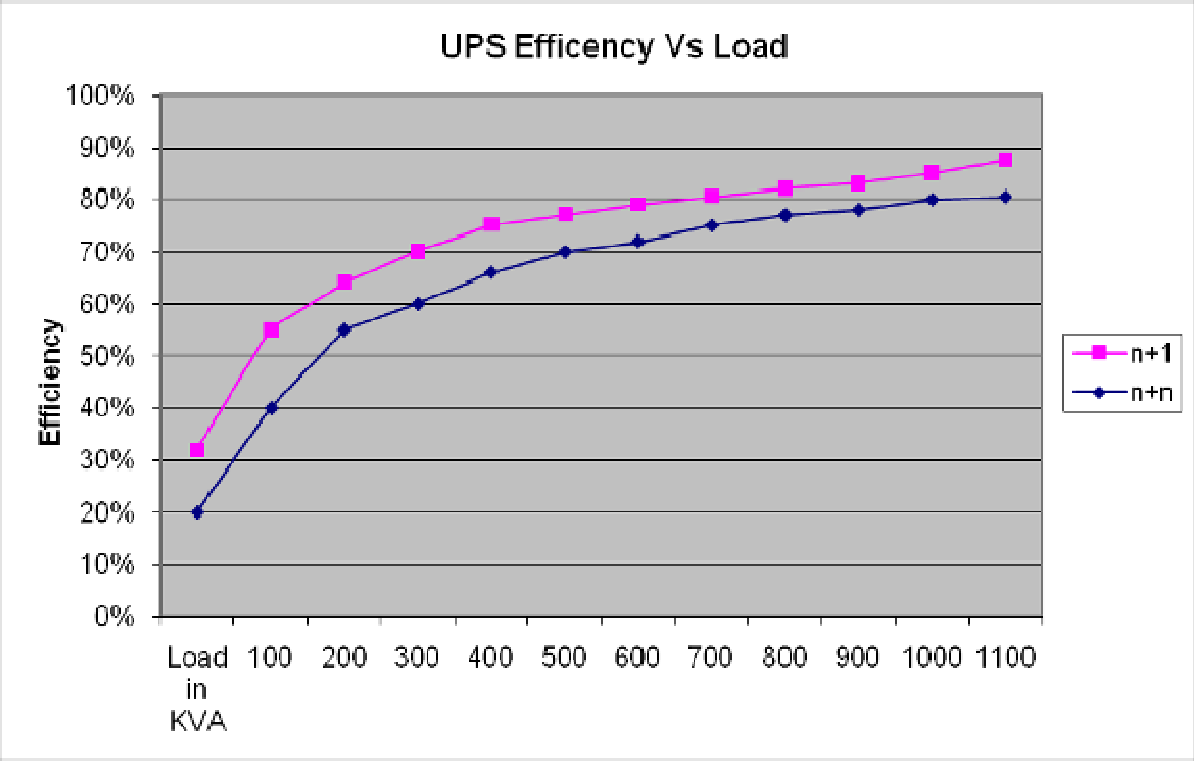
- **Electrical room & UPS room close to Data Center**
  - Reduction in Cable length & Distribution loss
- **Fire Separation room close to Data Centre**
  - Less amount Gas to maintain the pressure
- **Control room close to Data Center**
  - Helps Physical Monitoring
- **Rack arrangement**
  - For maintaining Hot & Cold aisle & Passage for equipment movement

Data Center – Power Design Best Practices



- Highly efficient power equipment (UPS, Power Supplies)
- Modular design of Power & Cooling equipment
- Avoid over designing of Power infrastructure
- Improvise design of containment to reduce resistance to airflow
- Right IT Equipment selection like sleep/stand by load, IT equipment fans

Benefits of UPS N+1 Configuration over N+N



Advantages in N+1 vs N+N

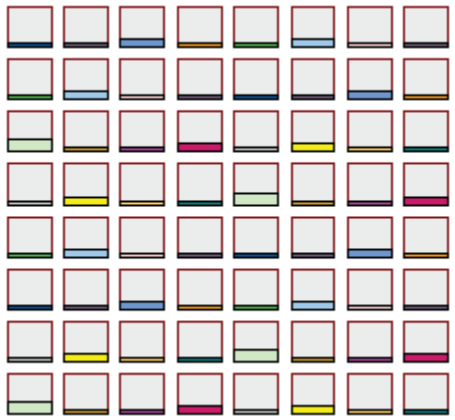
- Less losses & High efficiency
- Cost & Space saving

Data Center – Cooling Design Best Practices

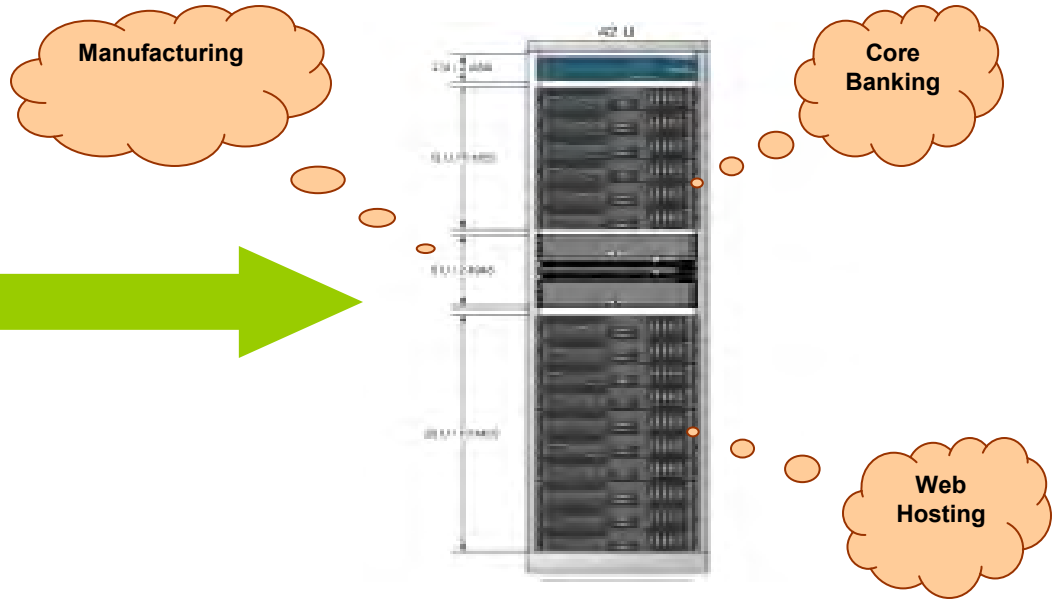
- **Use of self calibrated control system for CRAC**
- **High efficiency Airflow grill with Damper control**
- **Hot & Cold aisle concept without air leak from rest of the floor**
- **Return Air Plenum**
- **Rack Blanking Plate to avoid short cycling**
- **CDM initiative by using R134a refrigerant instead of R22 in chillers**
- **Free Cooling gives 20% saving in Opex cost with 2% additional Capex**
- **Free cooling implemented and planned at**
  - Highbridge (UK)
  - Johannesburg (SA)
  - Cape town (SA)
  - Pune
  - Delhi

The Future of Infrastructure is Virtual

Data Center Space consolidated into multi-tenant Virtualized Environment



Server Farm - TODAY



Data Center - TOMORROW

- Reduction in server footprints
- Moving from Multi tenant Colo DC to Multi tenant Virtual DC

Thank You