Upgrading the PRS datacentres: space requirement

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PRS / UTS scenario: then and now

- Year 2000
  - PRS: 600 locations
  - UTS: 0 locations
- Year 2008
  - PRS
    - 1600 locations
    - E-ticketing
    - Passengers demand uninterrupted service
  - UTS
    - 1600 locations
    - 350 ATVMs
    - 40% unreserved tickets computerised
    - No service interruption permissible
    - Poised for major expansion

The problem

- Failures of power, air-conditioning in existing PRS datacentres
  - Aging datacentres
- Increased server capacity requirements
  - Where to place additional equipment
    - Servers
    - Storage units
    - Network devices
- Change in equipment
  - From stand-alone servers to rack-mounted equipment
  - From mux-modem based serial networks to rack-mounted routers / switches

The solution

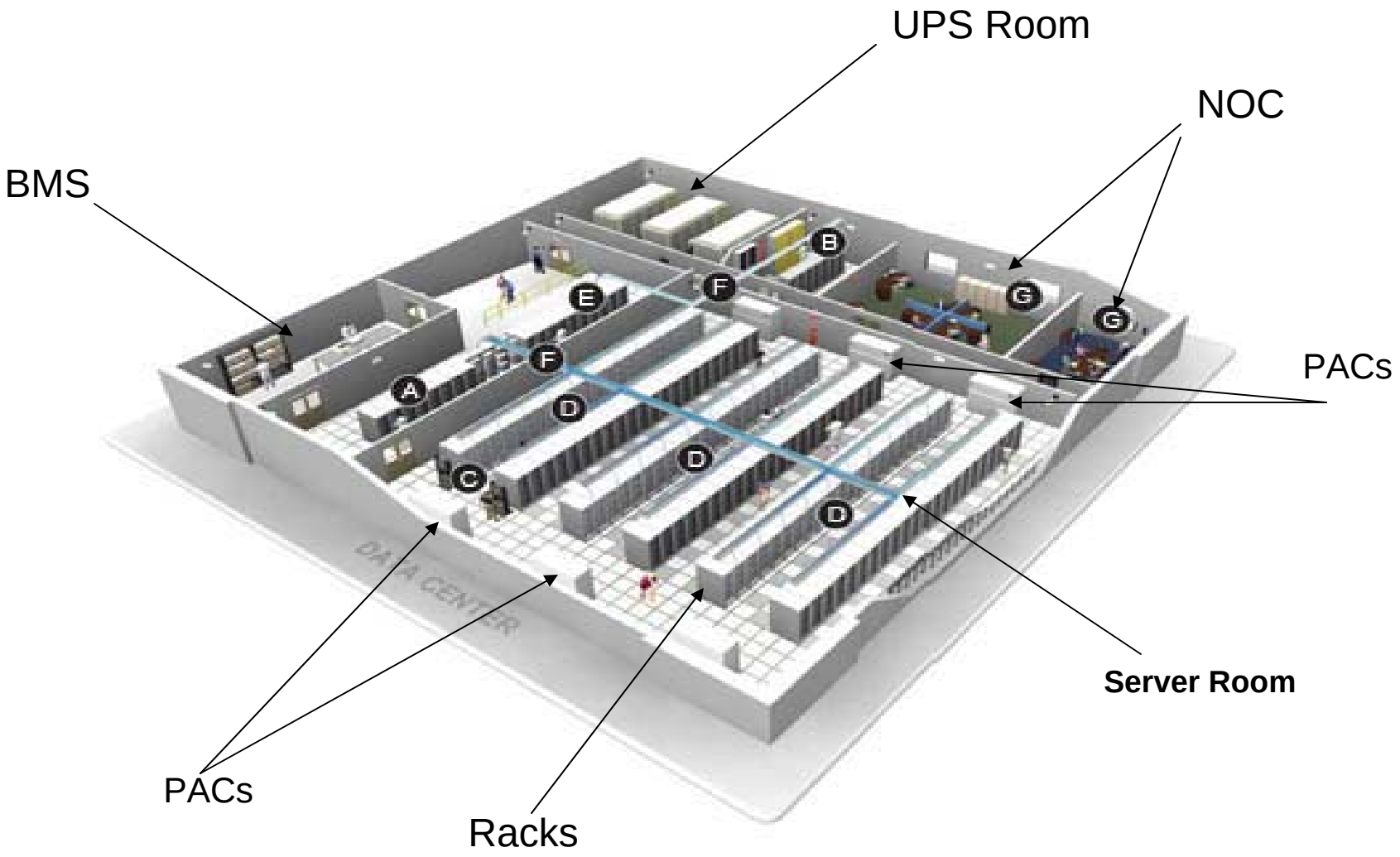
- Upgrade PRS / UTS datacentres to follow modern datacentre design and improve reliability
  - Prescribed temperature and humidity levels
  - Dust-free environment
  - Unmanned operation / controlled access into premises
  - Fail-safe concurrently maintainable facilities

A modern datacentre

- Equipment Racks
- Power
- Cooling
- Security
- Monitoring and Remote Management



Layout of Data Centre



Servers



- Blade servers
  - Need less space
  - Power density is more
  - Use 7 U or 14 U or rack space per blade chassis

- Rack Mountable Server
  - Needs less space for same capacity than conventional server
  - Miniaturized circuits cause fast heating of circuit-boards
  - Needs fast flow of cool air to remove the heat
  - Pushes air from front to back for cooling
  - Quickly overheats

Storage





Server rack



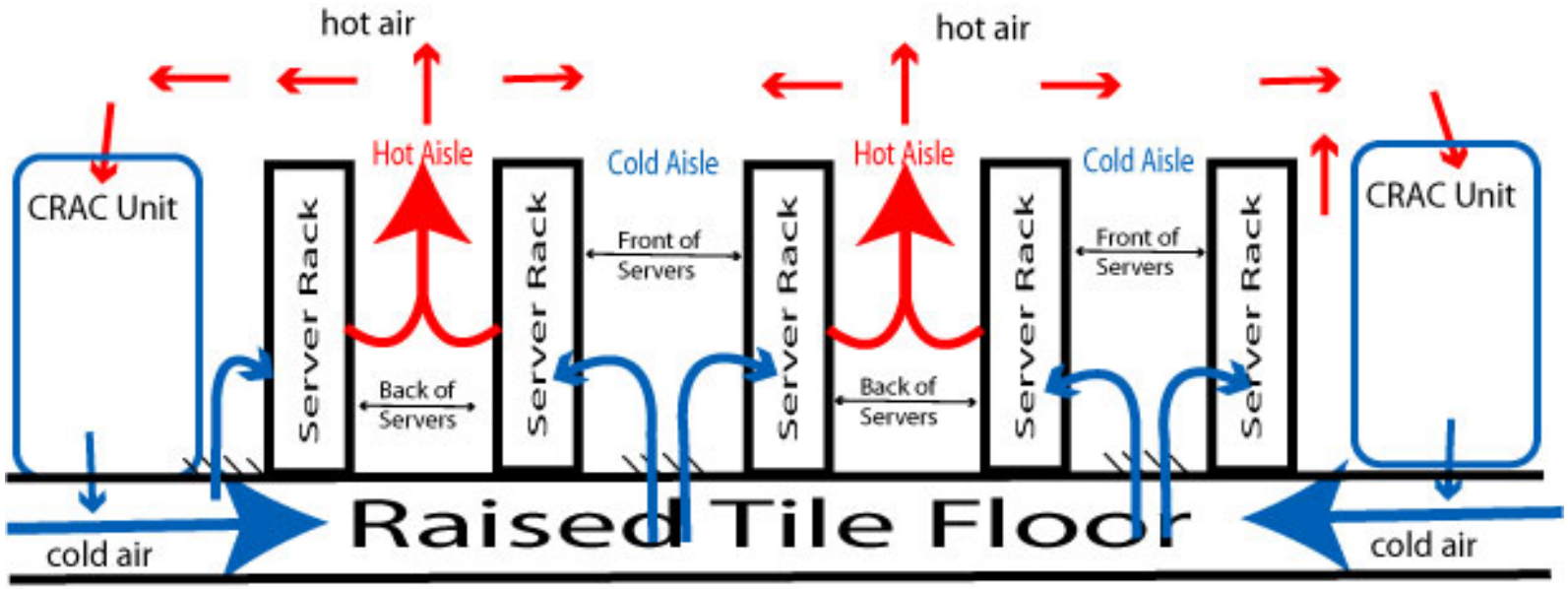
- Steel enclosure
- Standard rack is 42U
- Approximate height 2100 mm (7 feet)
- 600 mm / 800 mm width (2 feet / 2.33 feet)
- 1000 mm (sometimes 1200 mm) depth

Cooling: Precision Airconditioners / Computer Room Airconditioners

- High airflow to cool high density equipment
- Maintains average temperature between 22 and 24 degrees Celsius
- Keeps average relative humidity between 45 and 55 percent
- Uniformly cools the area
- Delivers cooled air through the floor, forcing it up through perforated tiles



Hot Aisle/Cold Aisle layout



Raised Floor

- A raised floor carries cool air to the equipment racks
- The raised floor also accommodates network cables and electrical cables
- Normally 450 mm to 600 mm (1.5 to 2 feet high)





UPS

- UPS should be dedicated for datacentre only
- Separate earth
- Conventional or modular UPS can be used



Fire Detection/Suppression System

- Fire detection and suppression systems help recognize and minimize the threat of fire
- FM200 or Inergen used as fire suppression medium
- Ionising smoke detectors placed in each zone of the datacentre
- VESDA (very early smoke detection apparatus) detects abnormal air particulates caused by equipment overheating



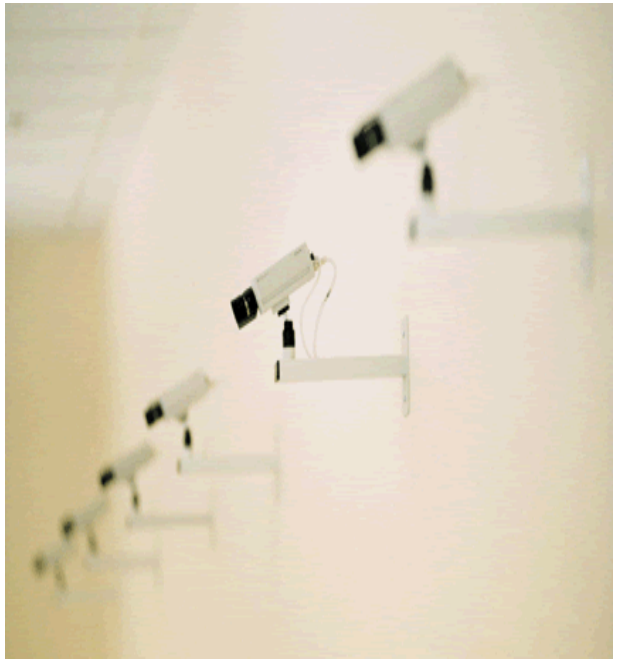
Access Control/Security

- Access control systems control entry into or within buildings through controlling doors, revolving doors, turnstiles, gates and barriers. These doors are opened usually entering a code into a keypad, presenting a key fob or token, swiping a card or remotely by entry phone system.









Automatic Transfer Switch

- When a power interruption occurs the Automatic Transfer Switch (ATS) automatically switches the power from the primary source to an alternate supply. In the event of an emergency, the ATS immediately powers the generator and within a few seconds transfers the power



Action taken so far

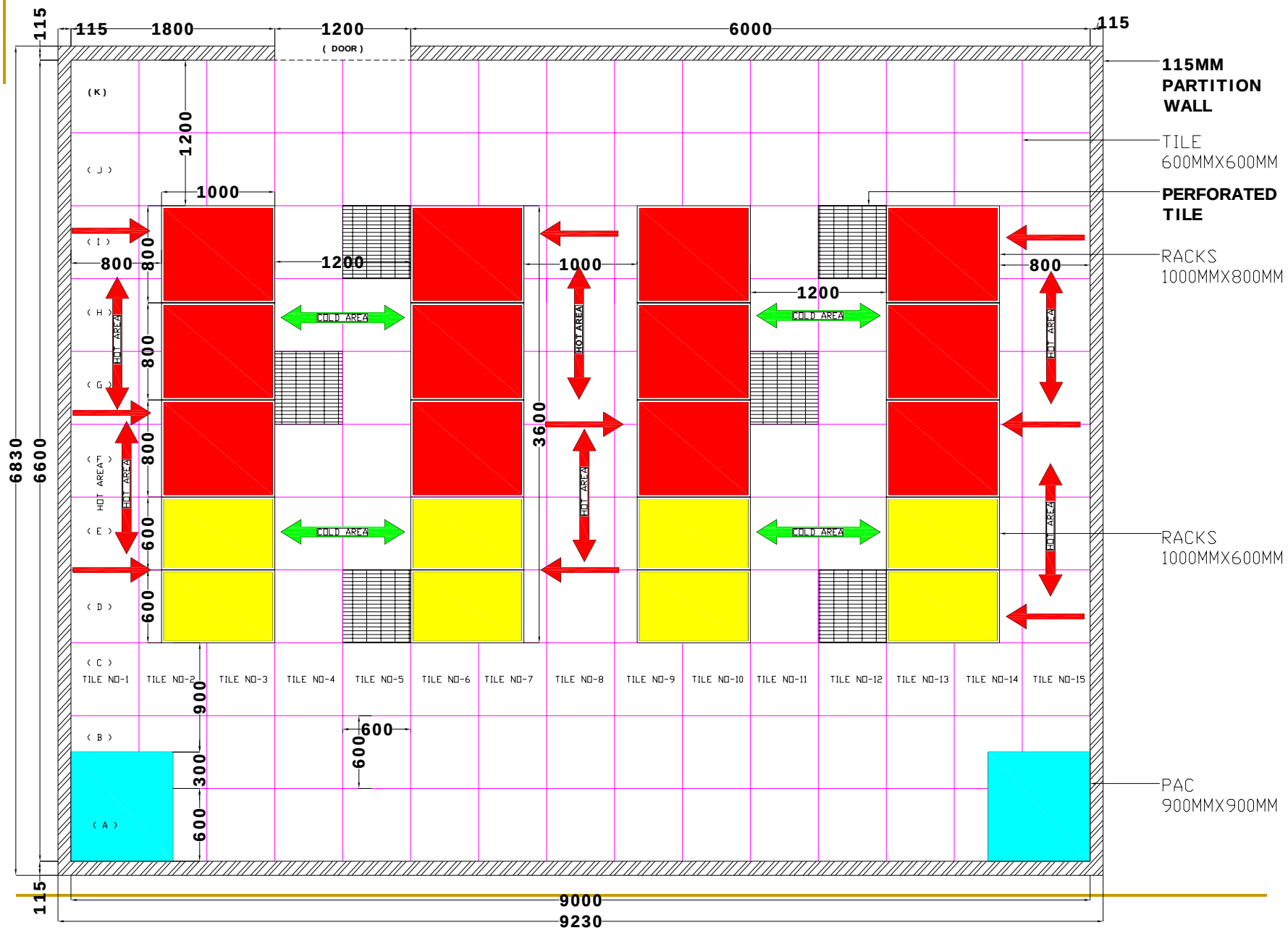
- Work for upgradation of PRS datacentres sanctioned in current financial year
- Case studied
  - It is not possible to upgrade running datacentre in same space
  - Appropriate space needed near existing datacentre
  - Space to be developed with modern datacentre facilities, and then equipment to be shifted
- All facilities should be developed in integrated fashion
  - Space
  - Power
  - Cooling
  - Security, management
- Facilities conforming to Tier 3 datacentre planned

Tier Classification per Uptime Institute and TIA-942 Draft Standard

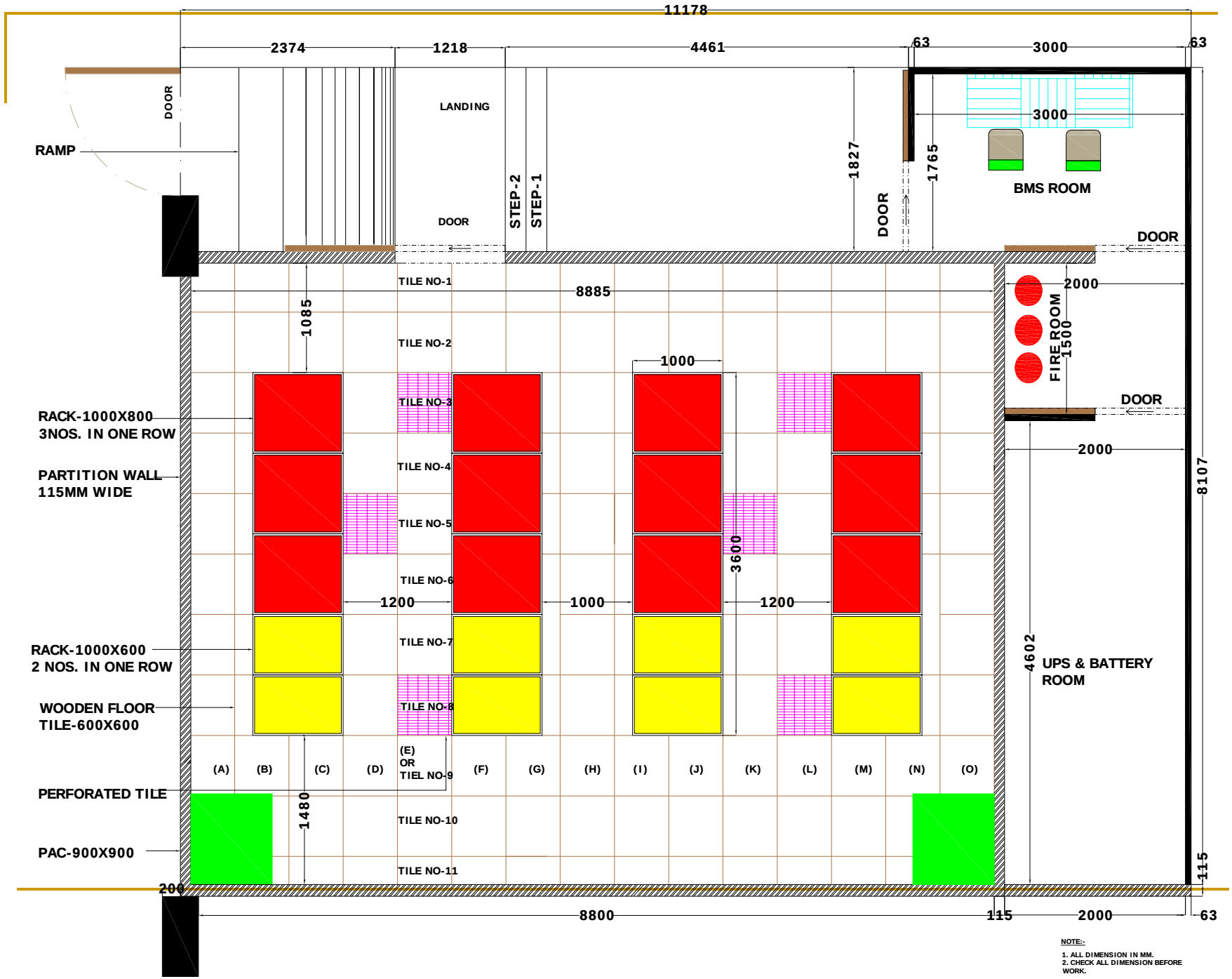
	Tier 1	Tier II	Tier III	Tier IV
Site Availability	99.671%	99.749%	99.982%	99.995%
Downtime (hours/Yr)	28.8	22.0	1.6	.4
Operation Center	Not Required	Not Required	Required	Required
Redundancy for Power and Cooling	N	N+1	N+1	2(N+1) OR S+S
Gaseous Fire Suppression System	Not Required	Not Required	FM200 or Inergen	FM200 or Inergen
Redundant Backbone Pathways	Not Required	Not Required	Required	Required

Standard Layout for PRS / UTS upgraded Data Centre

- Standard dimension 6.6m x 9m
- Equal space (60 square metres) required for support areas
  - Staging area
  - UPS and batteries
  - Fire suppression system
  - Datacentre monitoring system
  - Network equipment


115
115
1800
1200
(DOOR)
6000
115
115MM
PARTITION
WALL
TILE
600MMX600MM
PERFORATED
TILE
RACKS
1000MMX800MM
RACKS
1000MMX600MM
PAC
900MMX900MM
(K)
(J)
(I)
(H)
(G)
(F)
(E)
(D)
(C)
(B)
(A)
1200
1000
800
800
800
800
600
600
1200
1000
1200
800
3600
COLD AREA
COLD AREA
COLD AREA
HOT AREA
HOT AREA
HOT AREA
HOT AREA
HOT AREA
HOT AREA
TILE NO-1
TILE NO-2
TILE NO-3
TILE NO-4
TILE NO-5
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TILE NO-7
TILE NO-8
TILE NO-9
TILE NO-10
TILE NO-11
TILE NO-12
TILE NO-13
TILE NO-14
TILE NO-15
900
600
600
300
600
6830
6600
115
9000
9230

Proposed Layout For Chennai Data Centre



NOTE:-

1. ALL DIMENSION IN MM.
2. CHECK ALL DIMENSION BEFORE WORK.

Other requirements for datacentre space

- Proper cooling air-flow is essential
- Floor to ceiling height minimum 3300 (11 feet), which will enable raised floor to ceiling height of 2700 mm (9 feet)
- Dust-free environment
- Staging area to enable equipment to be unpacked and tested outside the datacentre
- Space for fire suppressant should be adjacent to datacentre
- Easy entry and exit for equipment is required, preferably near lift

Features of standardized layout

- 20 racks can be accommodated
  - 800 rack units of space for equipment
  - Potentially, about 200 servers / storage units can be accommodated
- Precision airconditioning, fire suppression, access control, and UPS along modern design principles
- Integrated design, to be built by a single agency

Features of standardized layout

- Initially fewer racks may be placed
  - 80 KW UPS power initially
  - Average equipment density nowadays is 8 KW per rack
  - Can go up to 16 to 20 KW per rack
  - UPS power can be stepped up in stages if required
  - Cabling to be done of adequate capacity
- Redundant layout scheme for all active and passive components
  - Power supply equipment (switches, panels, circuit-breakers)
  - Cables
  - Air-conditioning
- Designed to last for at least 8 to 10 years

Action requested from Zonal Railways

- Identify suitable space of 9 metres by 6.6 metres approximately for upgraded datacentre
- Identify adjacent space of 60 square metres for supporting facilities
- Inform Board (C&IS Dte) accordingly

Thank you