Host Utilities

Co - Host Utilities

ORGANIZER

ISGF
India Smart Grid Forum

Supporting Ministries

India SMART UTILITY Week 2024

Session : 3RD INDIA - GERMANY SMART ENERGY WORKSHOP
THEME: DEMAND RESPONSE

Existing Regulatory Framework and Current Challenges/Gaps for DR in India

Presented By

Samved Sunil Patil, Executive Director, Grant Thornton Bharat

Agenda

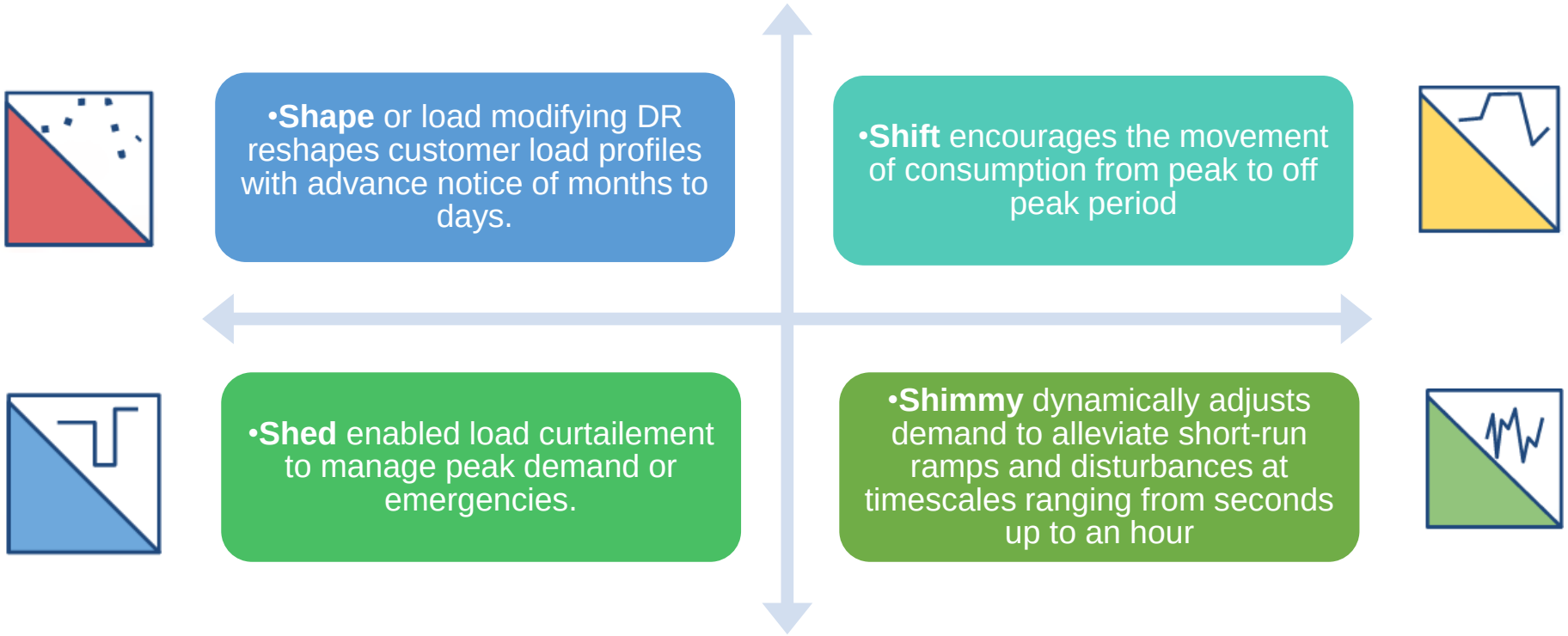
- Demand Response Introduction
- Current Regulatory Framework
- Challenges in DR implementation in the country

Demand Response Introduction

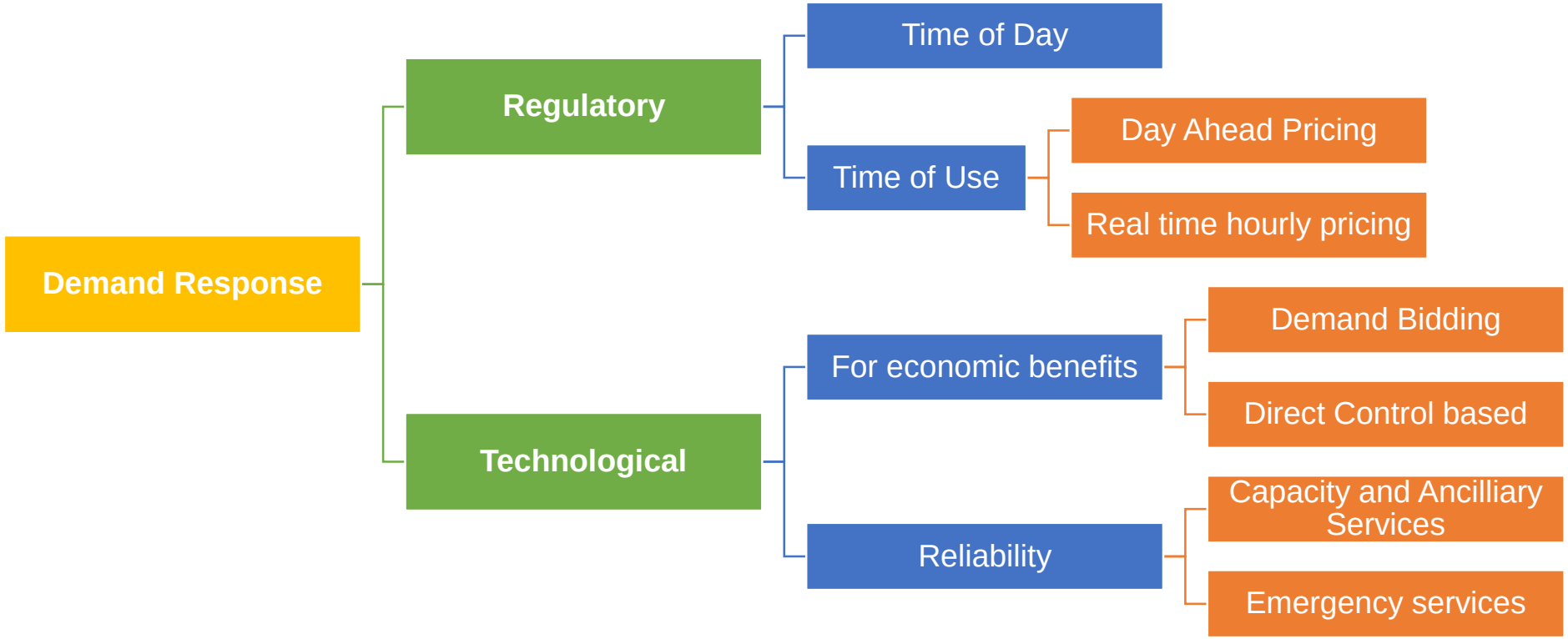
DR Introduction

As per IEA, demand response refers to balancing the demand on power grids by encouraging customers to shift electricity demand to times when electricity is more plentiful or other demand is lower, typically through prices or monetary incentives.

Services provided by Demand Response



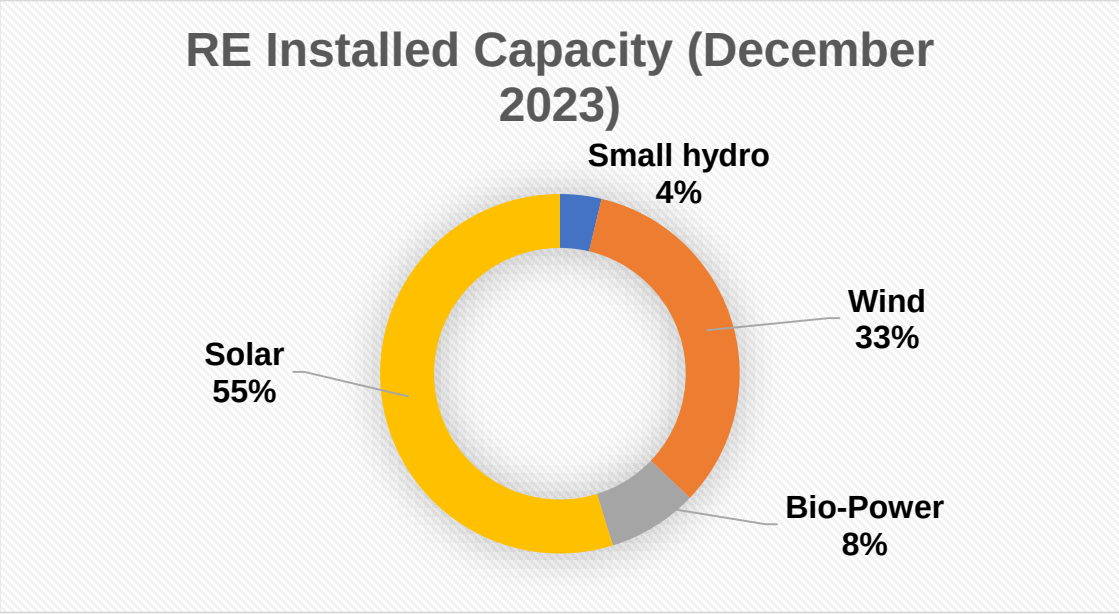
Types of Demand Response



- Regulatory DR is also called price based, behavioral or non dispatchable DR
- Technological DR is also called incentive based or dispatchable DR

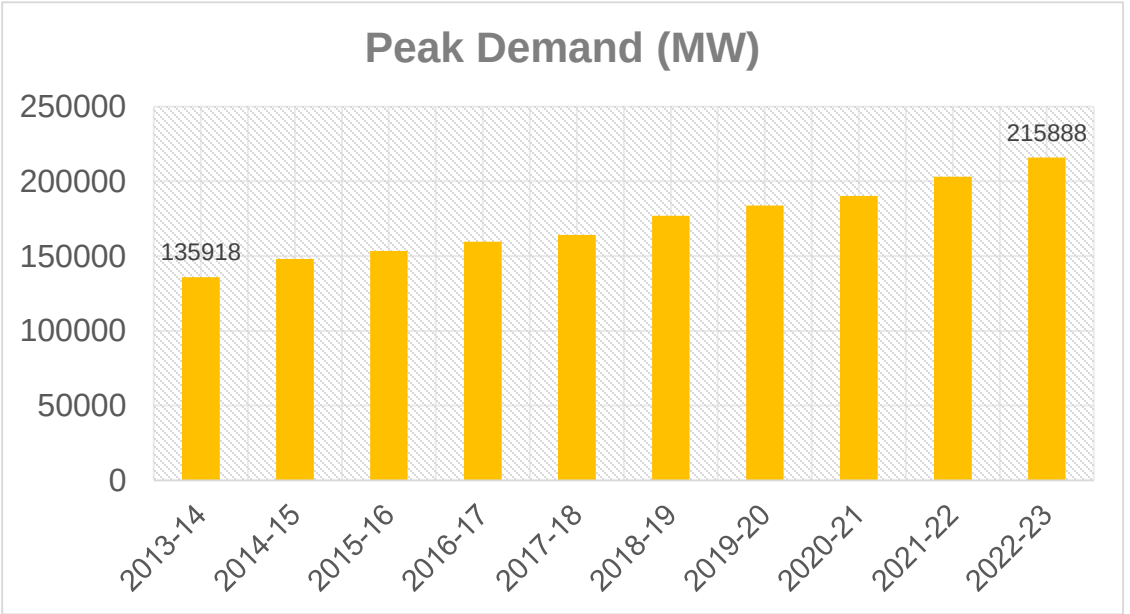
Rationale and Benefits of DR in Indian Context (1/2)

Decarbonization of energy purchase



- Increasing RE grid introduces certain limitations that may result in a mismatch between supply and demand
- Crucial in shaping the load profile to align supply with the demand, facilitating effective integration of high levels of RE and managing peak loads.

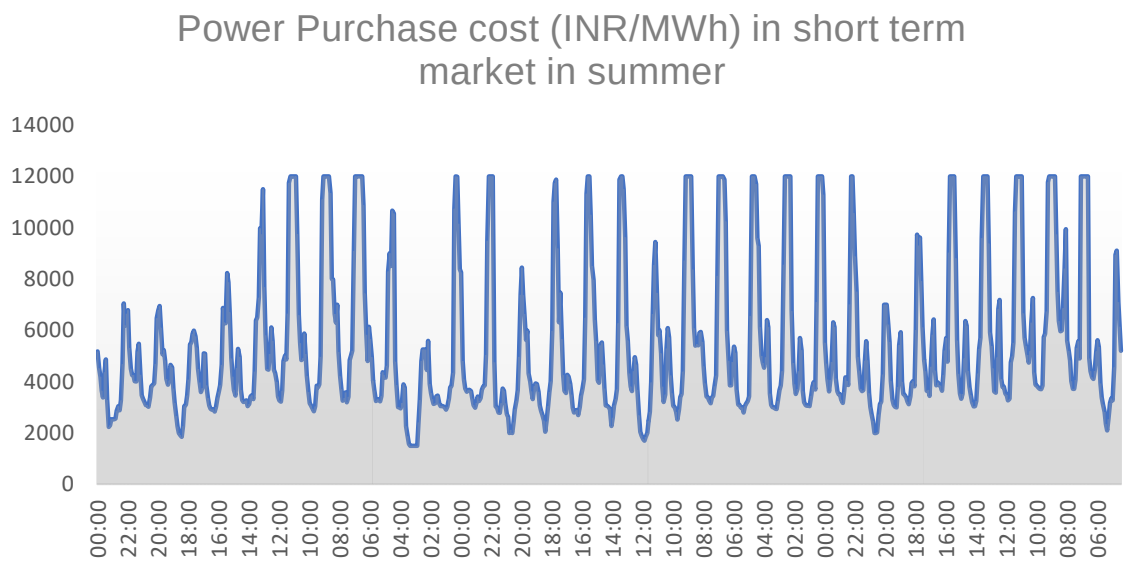
Load Management



- Contributors to this peak also provide an excellent opportunity to introduce DR
- DR for managing DSM can also play a significant role in maintaining grid stability

Rationale and Benefits of DR in Indian Context (2/2)

Power Purchase Cost Optimization



- DR has been included in Electricity (Amendment) Rules, 2022 as part of Guidelines for Resource Adequacy Planning Framework for India
- Can help discoms avoid purchasing costly power during peak hours

Network Capacity enhancement

1.Infrastructure only loaded during peak

- Distribution network planning still revolves around addressing peak loads
- DR can be an effective Non-wire alternative for grid planning

Distributed Energy Resources/ EV charger

- Distributed Energy Resources (DERs) present operational challenges such as voltage violations and thermal overloading of network assets
- DR can offer an alternative to optimize network performance and efficiency without resorting to extensive infrastructure upgrades

DR Pilots in the country

Discom	Year	Rationale	DR Strategy	Consumer Segment
Tata Power Company Ltd – Mumbai	2012	Peak Demand	Aggregator-based and automated DR	Commercial and industrial
Tata Power Delhi Distribution Limited (TPDDL)	2014	Peak demand/Grid stress	Automated DR	Commercial and industrial
BSES Yamuna Power Limited (BYPL)	2020	Peak demand	Automated DR	Residential and commercia
BSES Rajdhani Power Limited (BRPL)	2018-19	Peak demand	Behavioural DR	Residential
Tata Power Delhi Distribution Ltd (TP-DDL)	2021	Peak demand	Behavioural DR	Residential
Uttar Pradesh Power Corporation Limited (UPPCL)	2019	Peak demand	Manual DR	Commercial and industrial
Jaipur Vidyut Vitaran Nigam Ltd (JVVNL)	2013-14	Deviation from schedule	Manual DR with energy market integration	Commercial and industrial

Current Regulatory Framework

CERC (Indian Electricity Grid Code) Regulations, 2023

Definition as per regulation: Variation in electricity usage by the end consumers or by a control area manually or automatically, on standalone or aggregated basis, in response to the system requirements as identified by the concerned load dispatch center.

RE Integration	• Resource planning code: demand response as one of the measures for managing the intermittency and variability of renewable energy sources.
Distribution licensees	• Mandates to forecast the demand in their control area, considering captive generating plants, energy efficiency measures, distributed generation, and demand response, across different time horizons, namely long-term, medium-term, and short-term.
Ancillary Services	• To maintain the grid frequency within the allowable band of 49.9 Hz – 50.05 Hz, the control area must deploy demand response as secondary reserve in accordance with the Ancillary Services Regulations, or the respective regulations on Ancillary Services of the State.
Load Dispatch Center	• Estimate and ensure the adequacy of resources, demand response capacity and generation flexibility requirements. • Responsible for optimum scheduling and dispatch of electricity, monitoring of real time grid operations and management of the reserves, including energy storage systems and demand response • Dispatching emergency demand response in case of contingencies

CERC (Ancillary Services) Regulations, 2022

These regulations are applicable to regional entities, including entities having energy storage resources and entities capable of providing demand response who are qualified to provide Ancillary Services. Currently for demand response ancillary services are available for secondary and tertiary reserves only.

Secondary Reserve Ancillary Services (SRAS)

- A generating station or an entity capable of providing demand response, on standalone or aggregated basis, connected to inter-State transmission system or intra-State transmission system, shall be eligible to provide Secondary Reserve Ancillary Service. If it:
  - Has bi-directional communication system with RLDC.
  - Can provide minimum response of 1 MW.
  - Has metering and SCADA telemetry in place for monitoring and measurement of energy delivered under SRAS.
  - Can respond to SRAS signal within 30 seconds and providing the entire SRAS capacity obligation within fifteen (15) minutes and sustaining at least for the next thirty (30) minutes.

Tertiary Reserve Ancillary Services (TRAS)

- On standalone or aggregated basis, connected to inter-State transmission system or intra-State transmission system shall be eligible for participation as TRAS Provider, if
  - it can vary its active power output or drawl or consumption.
  - it can provide TRAS within 15 minutes and sustaining the service for at least next 60 minutes

Guidelines for Resource Adequacy Planning Framework for India

Resource adequacy planning typically focuses on ensuring a reliable and secure electricity supply to meet the growing demand. In the context of demand response, few specific guidelines have been developed to integrate demand-side resources into the overall resource adequacy planning framework

Capacity Credits

- The guidelines have formulated several methodologies for assessing the capacity credits. Below mentioned approaches were outlined towards fulfilling resource adequacy requirements :
  - Capacity Credit Approximation with Top Demand Hours
  - Capacity Credit Approximation with Top Net Load Hours,
  - Expected Load Carrying Capability

Resource Adequacy Plan (RAP)

- As per the guidelines the constraints such as periods when load shifting can occur, and the maximum quantum of load which can be shifted over a period shall be included while undertaking the Resource Adequacy Plan (RAP).

CERC (DSM and Related Matters) Regulations, 2022

CERC has issued the Deviation Settlement Mechanism and Related Matters Regulations, 2022, which came into force from April 1, 2022. The regulations aim to maintain grid discipline and security by ensuring that the actual generation and drawl of electricity by the entities is as close as possible to their scheduled generation and drawl.

Deviation price vector (DPV)	• DPV was introduced, which is a set of prices for different time blocks and deviation bands, based on the average frequency of the corresponding time block of the previous week
Deviation charges	• Specified deviation charges for different categories of entities, such as renewable energy generators, hydro generators, thermal generators, inter-state transmission licensees, regional entities and others
Incentives and Penalties	• Regulations provide incentives for entities that help in reducing the system frequency deviation and penalties for entities that cause or aggravate the system frequency deviation
Process	• Regulations also lay down the settlement procedure, accounting methodology, payment security mechanism, dispute resolution mechanism and reporting requirements for the deviation settlement mechanism.

Electricity (Rights of Consumer) Rule, 2020

The rule provides the rights and obligations of the consumers which the distribution licensees have to follow for supply of electricity. The rule also defines the metering, billing and outage schedules that aims to improved service quality and responsiveness from electricity distribution companies along with increased transparency and consumer control over electricity consumption.

As per **Electricity (Rights of Consumers) Rules**, 2020:

- Tariff during non-peak hours as specified by SERC shall be 10%-20% less than the normal tariff
- During peak hours, the tariff will be 10 to 20 percent higher.
- Applicable for Commercial and Industrial consumers having Maximum demand of 10 KW and above, from 1st April 2024
- For all other consumers except agricultural consumers, latest from 1st April 2025.
- Shall be made effective immediately after installation of smart meters, for the consumers with smart meters.

Time of Day Tariff:

- All discoms except Northern Discoms and Discoms of J&K and Ladakh do have TOD tariff for commercial and/or residential consumers
- Kerala, AP and WB also have TOD for residential consumers

Smart Meter Target:

- Install more than 250 million smart meters by 2025-26
- More than 5.5 million installed by May 2023

Challenges

Regulatory Challenges

There are two key challenges in implementation of DR in India

Lack of DR specific regulations in India

- India has DSM regulations which have been adopted by more than 20 states. It also has a regulation for ancillary market. But these do not provide a framework for DR in India.
- Regulations for Demand Response (DR) in India is a major hurdle to its wider adoption
- There is no comprehensive framework that specifically addresses DR programs, market mechanisms, and aggregator participation.

Lack of mechanism to incentivize utilities

- The existing pricing mechanism for Indian consumers predominantly emphasizes the recovery of the cost of generation and service costs through retail tariffs which is primarily based on the Aggregate Revenue Requirement (ARR) .
- Due to significant cross-subsidization, the current pricing structure lacks the ability to offer appropriate signals to end consumers for the prudent and efficient use of electricity.
- ToD tariff scheme is implemented but still does not incentivize the Discoms to implement demand response programs other than price-based DR programs

Institutional and Technology Challenges

Institutional Challenges

Roles of key stakeholders

- Load Dispatch Centers to trigger DR event as per existing regulations
- The role of the Discom in the DR event is not properly defined.
- Role of regulatory commission, load dispatch centers among others need to be clearly defined.

1.Need of DR Aggregators

- Role of aggregators need to be properly defined

Technological Challenges

Deployment of Smart Meters

1.Reliability of communication networks

1.Data protection

THANK YOU

For discussions/suggestions/queries email: ***isuw@isuw.in***

visit: www.isuw.in

Samved.Patil@IN.GT.COM