دانشگاه صنعتی شـریف

Sharif University Of Technology

Sharif University of Technology,
Intl. Campus in Kish Island

Reviewing and comparing the pricing of the plans offered in prominent companies that provide internet services

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Why Pricing Models Matter in Internet Services:

This project aims to analyze and compare the pricing strategies of leading internet service providers in Iran and globally, to identify ways to improve pricing models for domestic companies and operators.

Mobile Internet vs Wi-Fi

Types of Wi-Fi

ISPs in Iran

How to examine and compare?

Concept of ATL and BTL

Types of Plans

Mobile Internet

Type of Internet	Company	Duration	Type of Service	Speed (Mb/s)	Volume (GB)	Price (Rial)	Price per GB
Data	MCI	Monthly	ATL	Variable	1	140,700	140,700
Data	MCI	Monthly	ATL	Variable	2	187,600	93,800
Data	MCI	Monthly	ATL	Variable	3	254,600	84,867
Data	MCI	Monthly	ATL	Variable	4	285,400	71,350
Data	MCI	Monthly	ATL	Variable	5	316,200	63,240
Data	MCI	Monthly	ATL	Variable	6	370,000	61,667
Data	MCI	Monthly	ATL	Variable	7	380,000	54,286
Data	Irancell	Monthly	ATL	Variable	1	140,700	140,700
Data	Irancell	Monthly	ATL	Variable	2	187,600	93,800
Data	Irancell	Monthly	ATL	Variable	3	254,600	84,867
Data	Irancell	Monthly	ATL	Variable	4	285,420	71,355
Data	Irancell	Monthly	ATL	Variable	5	316,240	63,248
Data	Irancell	Monthly	ATL	Variable	6	370,000	61,667
Data	Irancell	Monthly	ATL	Variable	7	380,000	54,286

Table 1 - Monthly packages provided by Irancell & MCI

Mobile Internet

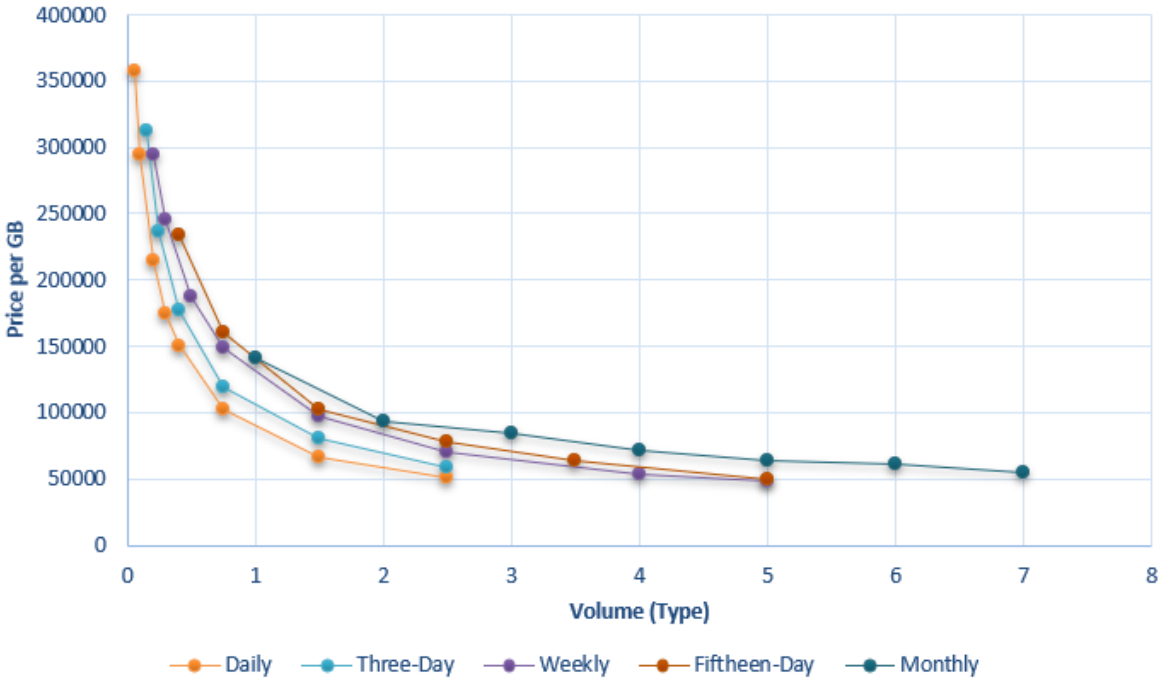


Figure 1 - Price per GB Chart of Irancell ATL Packages

Wi-Fi Internet

ADSL, VDSL and Optical-Fiber

Company providers

Wi-Fi Internet - ADSL

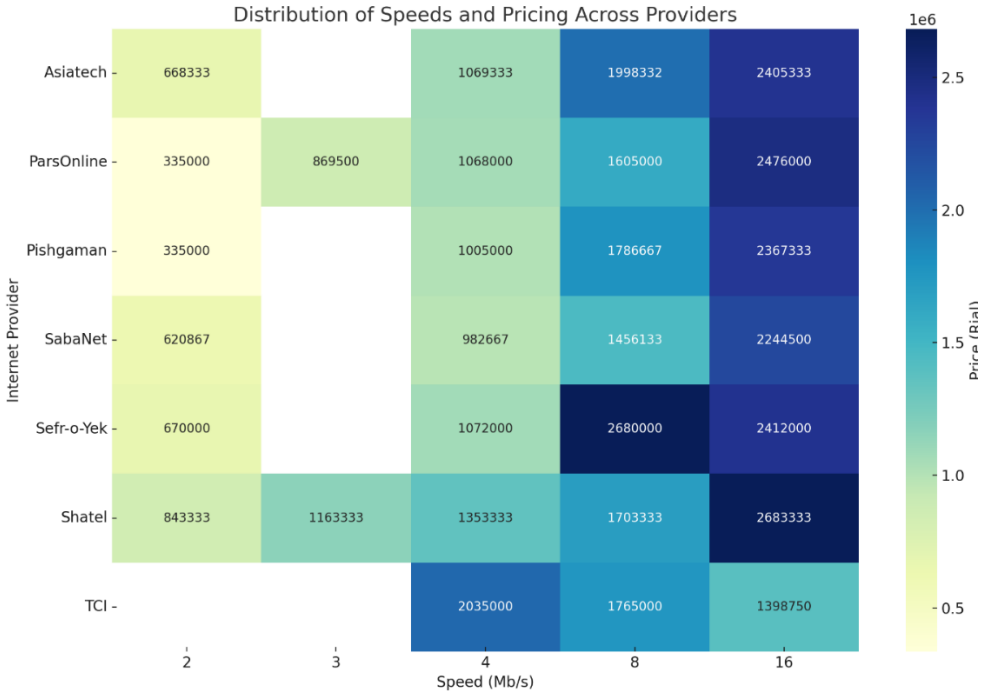


Figure 2 – Distribution of speeds and pricing across providers

Wi-Fi Internet - ADSL

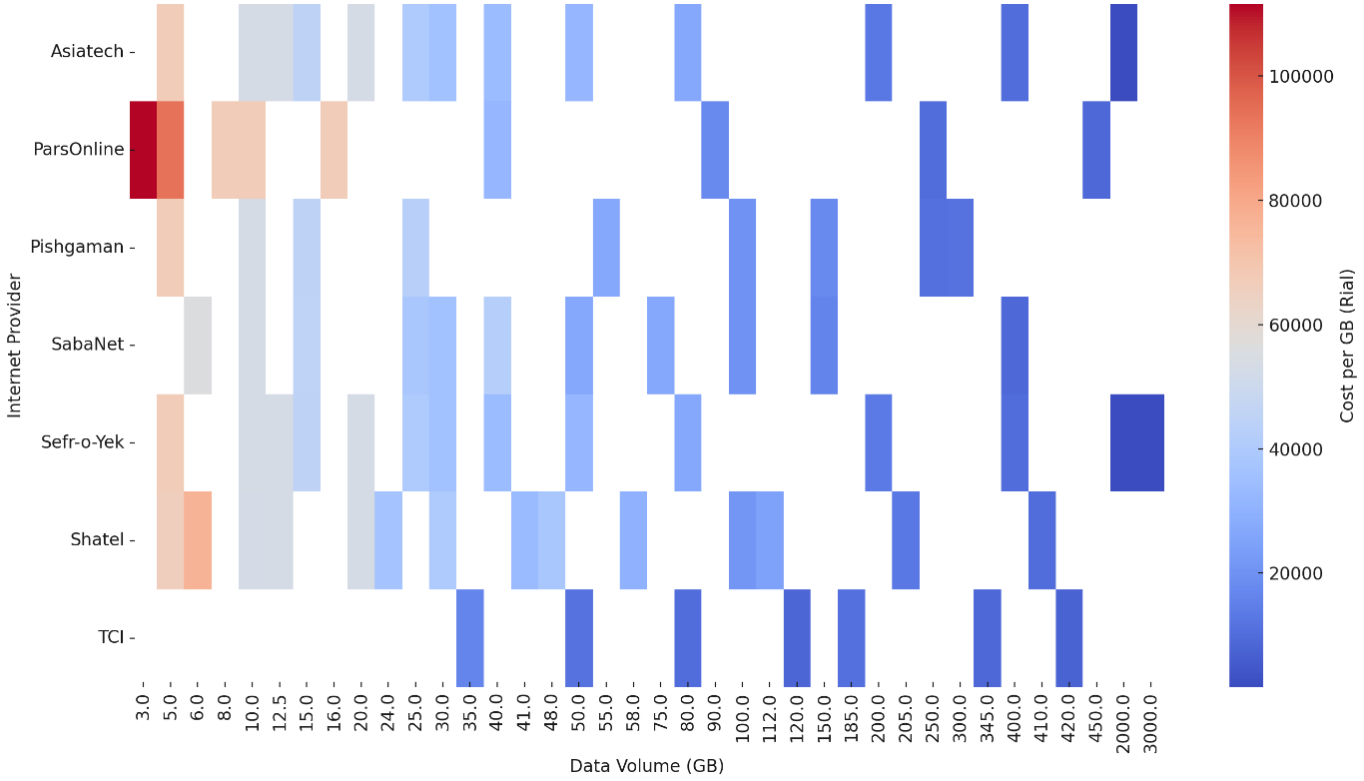


Figure 3 - Relationship between volume and price per GB across providers

Wi-Fi Internet - ADSL

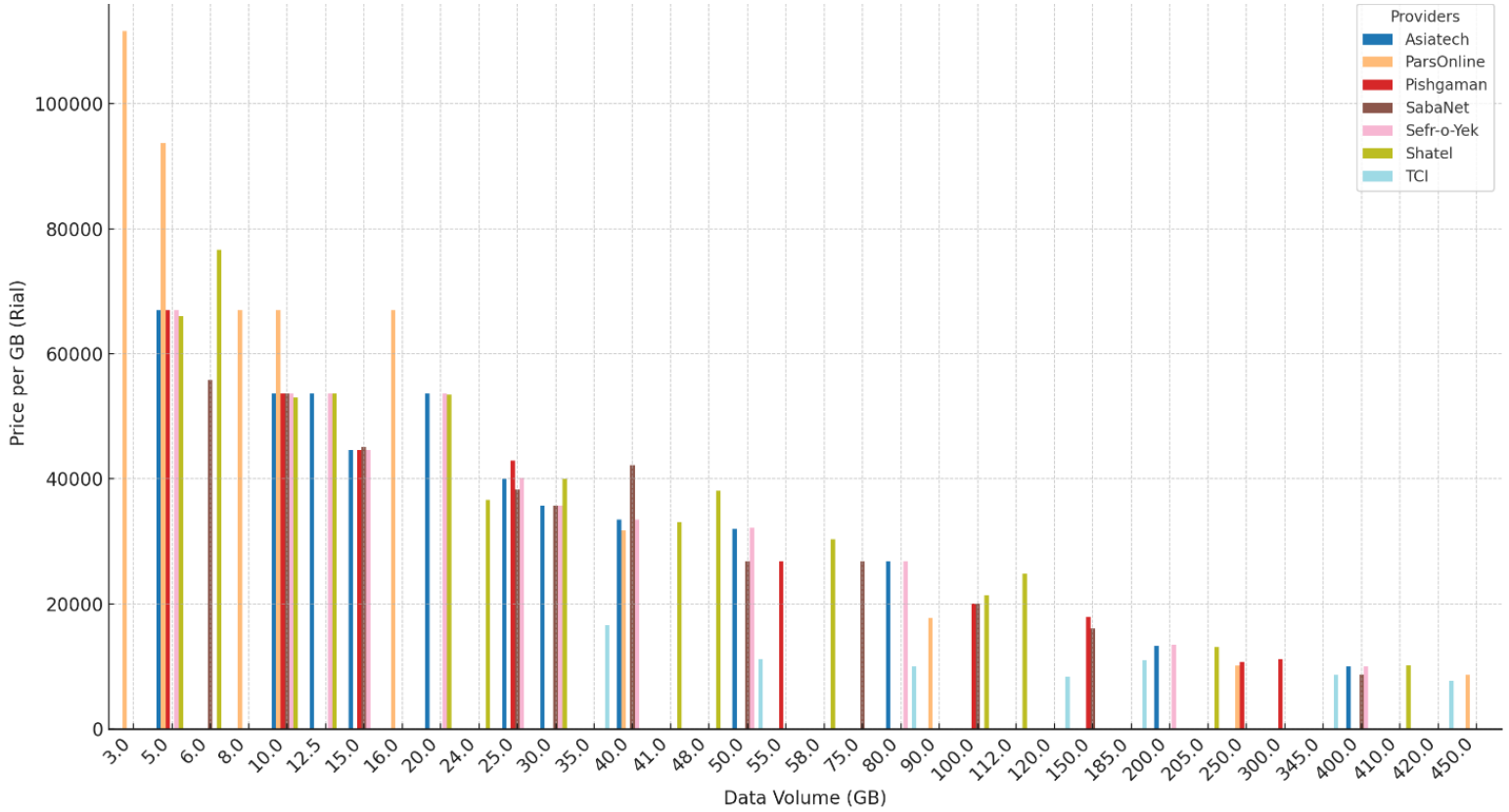


Figure 4 - Price per GB comparison across providers and data volumes

Wi-Fi Internet - VDSL

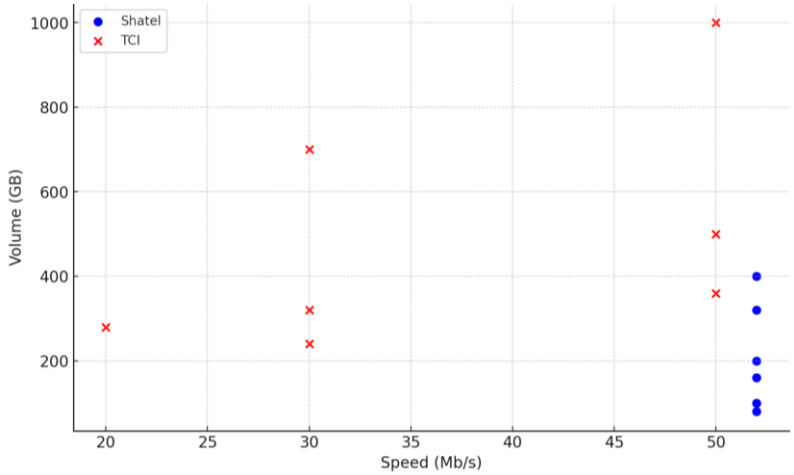


Figure 5 – Speed vs Volume comparison for Shatel & TCI

Figure 6 – Price per GB comparison of VDSL providers

ADSL vs VDSL

Figure 7 – Price/GB comparison of VDSL vs ADSL in Shatel

Figure 8 – Price/GB comparison of VDSL vs ADSL in TCI

Wi-Fi – Optical-Fiber

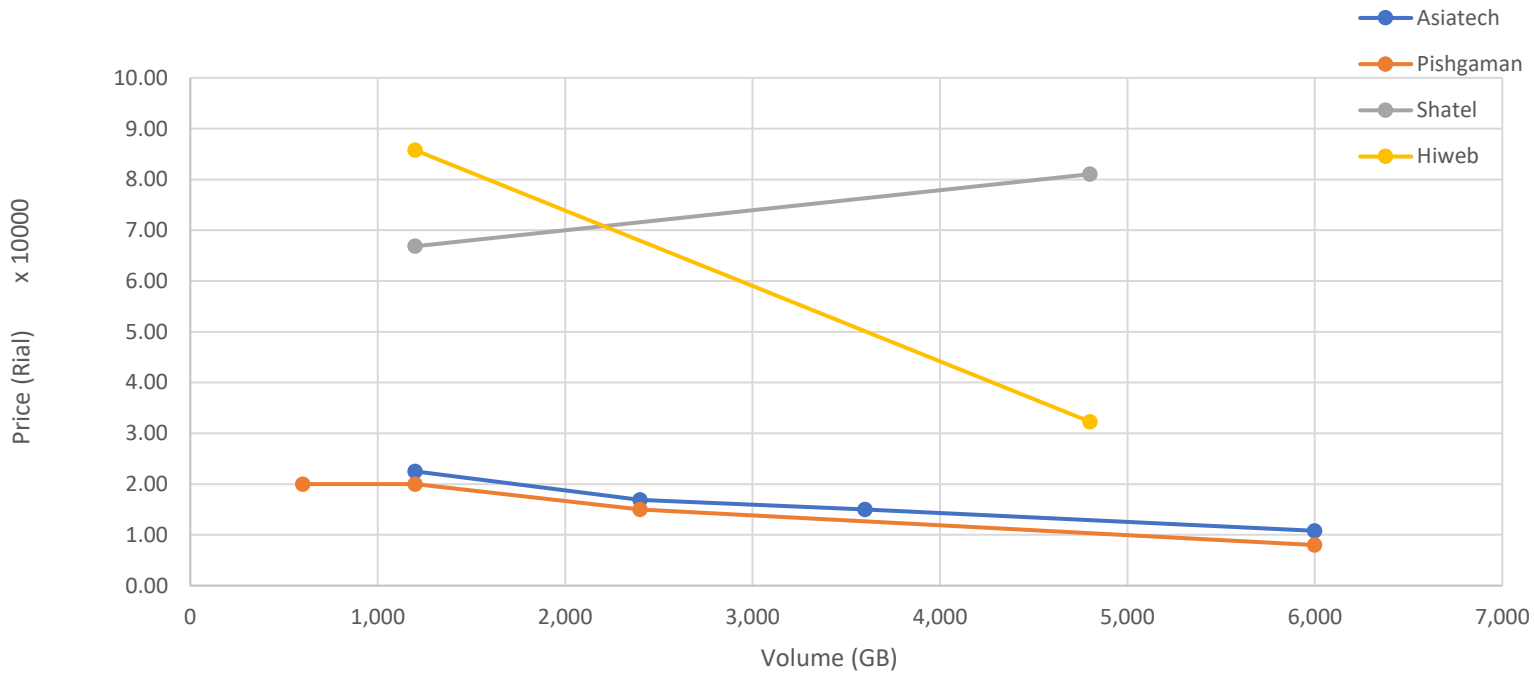
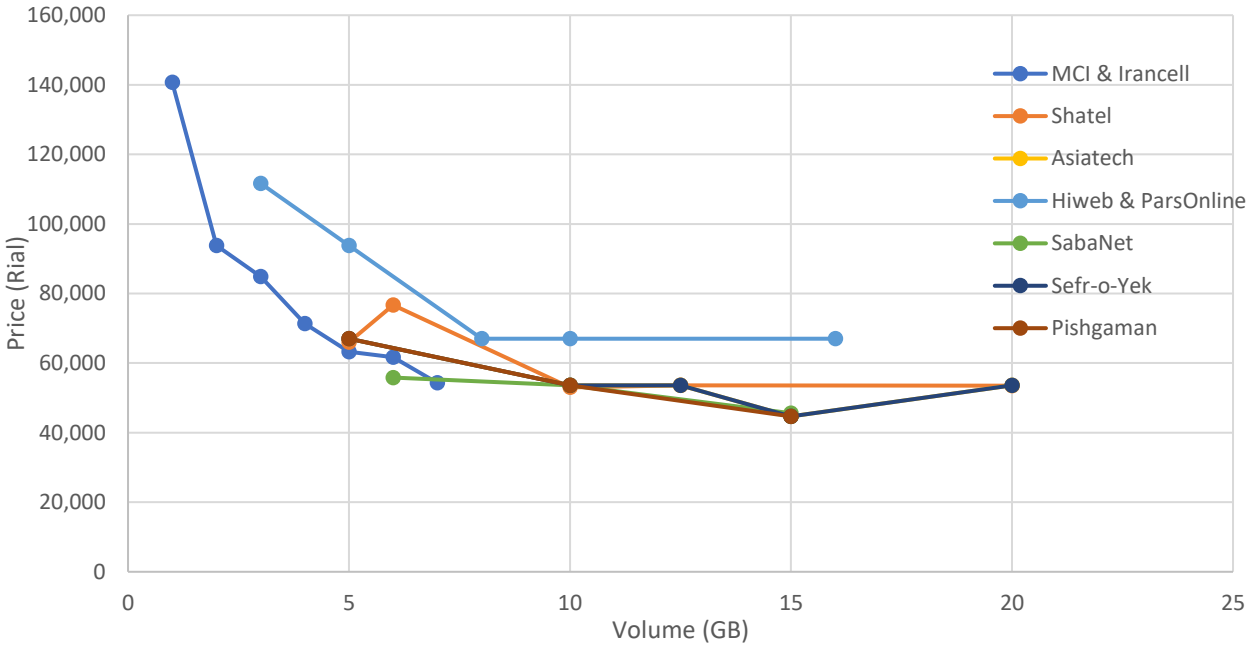


Figure 9 - Price per GB of Optical-Fiber services

Mobile Internet vs ADSL



Price per GB of Data Internet vs. ADSL (Considering under 20 GB Volumes)

Literature Review

The pricing strategies for internet services have been extensively studied in various research papers. This literature review presents an overview of different approaches, focusing on content-based pricing, time-dependent pricing, and competitive pricing strategies for internet service providers (ISPs).

The concept of content-based pricing in the mobile internet can be structured based on the type and quality of content consumed by users, as explored by Kivisaari and Luukkainen (2004). Similarly, the feasibility of pricing internet content, including the implications of different pricing strategies on user behavior and service provider revenue, was examined by Stiller et al. (2004).

Insights into how pricing strategies influence internet user behavior, including user responses to different pricing schemes, were provided by Altmann et al. (2001). Their findings suggest that pricing affects not only the quantity of data consumed but also user preferences for certain types of services.

Different pricing mechanisms for data services—such as pricing per minute, per gigabyte, and per megabit per second—were analyzed by Chen and Huang (2016). Their research highlighted the advantages and disadvantages of each model, offering recommendations on how ISPs can maximize revenue while maintaining customer satisfaction.

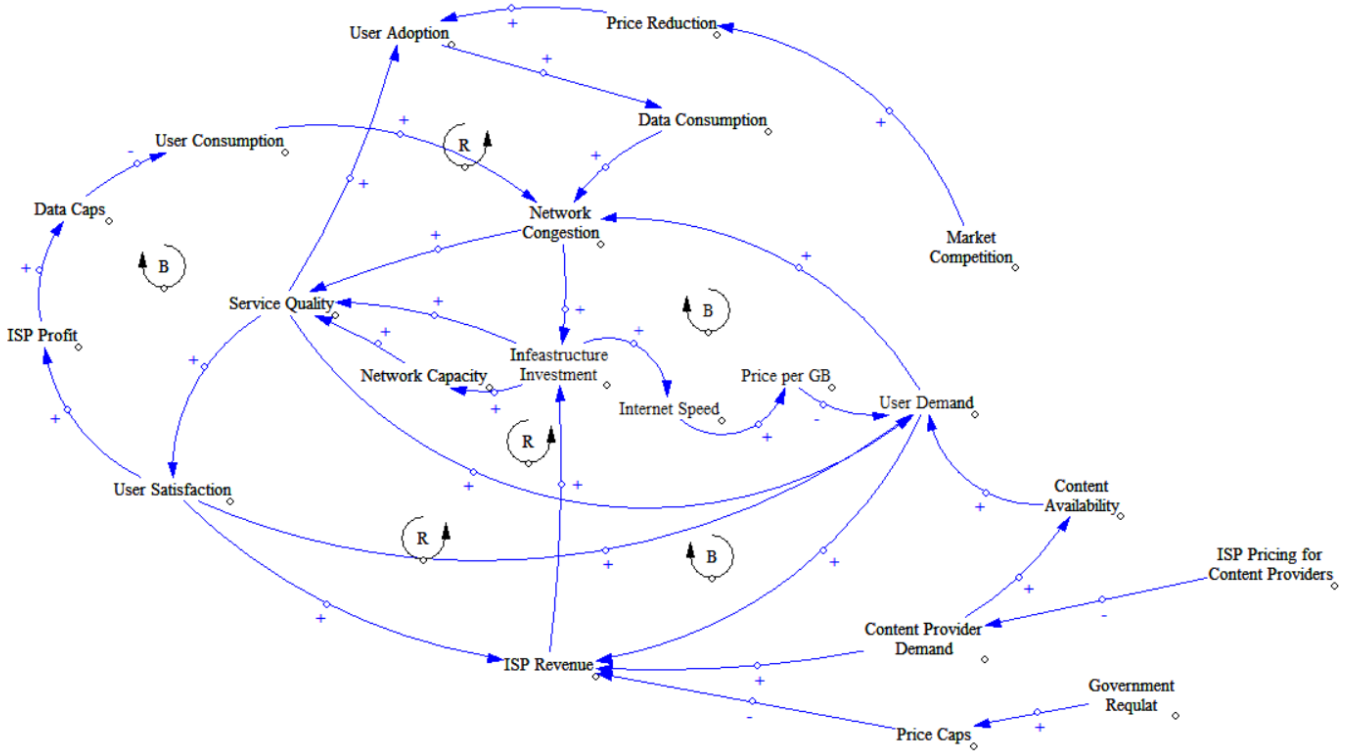
Literature Review

Pricing, competition, and content strategies for ISPs were discussed by Key and Steinberg (2020), including how service providers can differentiate themselves in a competitive market. A two-sided pricing model, which considers both consumers and content providers in the pricing strategy, was introduced by Li and Ma (2014), providing insights into how ISPs can optimize their pricing to attract more users while ensuring sustainable profitability.

A hybrid pricing model for mobile collaborative internet access, which combines fixed and usage-based pricing strategies, was proposed by Zhang et al. (2019). Additionally, time-dependent smart data pricing using machine learning techniques was examined by Tsai et al. (2017) and Sen et al. (2019), highlighting how ISPs can implement dynamic pricing models that adjust based on network congestion and user demand.

A competitive pricing approach enabling ISPs to optimize their pricing based on network conditions and market competition was introduced by Rajkumar and Ramanathan (2011). Their study provides valuable insights into how ISPs can enhance their competitive advantage through strategic pricing models.

Problem Description



Pricing policies of ISPs

1. **ISPs' current pricing approach and its modeling & optimization**
2. **Content-Based Pricing of Services**
3. **Market Dynamics in ISPs and Content Bundling**
4. **Two-Sided Internet Pricing for Revenue Optimization**
5. **Hybrid Pricing for Optimizing Mobile Network Resources**
6. **Adaptive Smart Pricing for ISPs: A Machine Learning Approach**
7. **Optimized Integration of Internet S. Sales: A Dynamic Market-Driven Approach**

1. ISPs' current pricing approach and its modeling & optimization

- Variable Symmetric Bandwidth Pricing
- Variable Asymmetric Bandwidth Pricing
- Byte Volume Pricing
- Combined Volume and Bandwidth Pricing
- Flat Rate Buy Out
- Utility Functions and Consumer's Maximization Problem

1. ISPs' current pricing approach and its modeling & optimization

The general utility function for a consumer is given by:

$$U(\theta, q) = A(q) - p(\theta, q)$$

Pricing by minutes: the utility function for a consumer of type θ is expressed as:

$$U^{M(B,\theta)} = B * M(\theta) - P_{M(\theta)}$$

The expected profit function for the seller under this pricing model is expressed as:

$$\Pi^{M(\theta)} = \max(M)\, E\left[P_{M(M,\theta)}\right]$$

Pricing per GB: the utility for a consumer of type θ is expressed as:

$$U^{G(Q,\theta)} = Q(\theta) * B - P_{G(\theta)}$$

The seller's optimization problem is:

$$\Pi^{G(\theta)} = \max(Q)\, E\left[P_{G(Q,\theta)}\right]$$

1. ISPs' current pricing approach and its modeling & optimization

Pricing by Mb/s : the utility function for a consumer of type θ is:

$$U^{Q(B,\theta)} = B * Q(\theta) - P_{Q(\theta)}$$

The expected profit function for the seller under this pricing model is:

$$\Pi^{Q(\theta)} = \max(Q)\, E\left[P_{Q(Q,\theta)}\right]$$

Comparison of Pricing Methods and Optimal Pricing Selection

2. Content-Based Pricing of Services

- The Emergence of Content-Based Pricing Models in Internet Markets
- Service Differentiation and Pricing Strategies in Fixed and Mobile Networks
- The Role of Willingness to Pay in Price Discrimination Mechanisms
- Challenges in Implementing Content-Based Pricing in the Fixed Internet Sector
- Innovative Pricing Opportunities in Heterogeneous Networks
- The Future of Content-Based Pricing in Converging Internet Infrastructures

3. Market Dynamics in ISPs and Content Bundling

- **Market Structure and Service Bundling in Internet Service Competition**
- **Pricing Choices and Consumer Decision-Making**
- **The Role of Transfer Prices in Competitive Dynamics**
- **Equilibrium Prices and Profits in Competitive Pricing Models**
- **Impact of Transfer Price on Market Competition and Outcomes**
- **Congestion Effects on Optimal Pricing Strategies**
- **Modeling the Market as a Stackelberg Game**

3. Market Dynamics in ISPs and Content Bundling

- **Linear vs. Non-Linear Congestion: Pricing Implications**
- **Market Outcomes under Different Pricing and Congestion Conditions**
- **Consumer Preferences and Their Role in Service Demand**
- **Equilibrium Uniqueness and Strategic Interactions in Competitive Markets**

4. Two-Sided Internet Pricing for Revenue Optimization

- **Revenue Maximization in Internet Service Provider (ISP) Pricing Models**
- **Congestion and Demand Elasticity in Pricing Strategy**
- **Equilibrium Pricing and Market Dynamics**
- **System Capacity and Congestion Sensitivity: Implications for Pricing**
- **Optimal Pricing under Symmetric and Asymmetric Market Conditions**
- **Pricing Strategies in Asymmetric Markets: Zero Pricing and Subsidies**
- **Future Directions in ISP Pricing Models**

5. Hybrid Pricing for Optimizing Mobile Network Resources

- **Addressing the Mismatch Between Mobile Data Demand and Network Capacity**
- **Hybrid Pricing Framework for Optimizing Network Resources**
- **Cooperative Scenario: Maximizing Combined Profits and User Satisfaction**
- **Competitive Scenario: Pricing Equilibrium in a Quantity Competition Game**
- **The Impact of Free Tethering on Network Efficiency**
- **Game Theory and Two-Stage Pricing Optimization**
- **Flexibility and Optimization in the Hybrid Pricing System**

6. Adaptive Smart Pricing for ISPs: A Machine Learning Approach

- **Challenges in Managing Internet Service Prices and Network Efficiency**
- **Dynamic Pricing: Adjusting Rates Based on Real-Time Network Conditions**
- **Predicting User Behavior for Optimized Dynamic Pricing Strategies**
- **Machine Learning in Dynamic Pricing: Behavior-Based Adjustments**
- **Leveraging User Data for Accurate Pricing Predictions**
- **Balancing Profitability and Customer Satisfaction in Pricing Models**
- **Simulation Results: Evaluating Transition-Based vs. Machine Learning Models**
- **The Role of Machine Learning in the Future of ISP Pricing Models**

7. Optimized Integration of Internet S. Sales:

A Dynamic Market-Driven Approach

- **Incorporating User Behavior into Dynamic Pricing Models**
- **Adaptive Pricing Strategy: A Departure from Static Pricing Models**
- **Real-Time Price Adjustments and Improved Efficiency in Bandwidth Utilization**
- **Broader Implications for ISP Competition and Market Structure**

Future work

Future Work

This research investigates pricing strategies for ISPs to maximize revenue while aligning with consumer preferences and network constraints. It explores various pricing models, such as Variable Symmetric and Asymmetric Bandwidth Pricing, Byte Volume Pricing, and Flat Rate Buy-Out. The study shows that pricing based solely on speed or data volume is not always effective in diverse markets. A dynamic pricing approach, considering user behavior, content differentiation, and network congestion, yields better outcomes. The paper also discusses how ISPs can collaborate with content providers to optimize joint profitability through transfer pricing mechanisms.

Future Work

The study highlights the role of machine learning and adaptive pricing models, enabling ISPs to use real-time data for dynamic pricing adjustments based on demand, congestion, and consumer preferences. Reinforcement learning further improves these models by continuously optimizing pricing. Future ISP pricing strategies will likely involve AI-driven, real-time models that factor in content consumption, time-of-day, and user-specific demand elasticity. The research suggests further work on deploying machine learning-based pricing in real-world scenarios, examining scalability and user acceptance. It also proposes exploring hybrid pricing models for mobile networks and multi-sided markets where ISPs act as intermediaries, leveraging content bundling and congestion-aware differentiation to maximize revenue.

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Thanks for your attention