**Telecom Network Risk & Churn Analysis**

**Objective**:  
This project aims to identify key drivers of customer churn for a telecommunications service provider by analyzing factors such as internet service types, security features, payment methods, customer demographics, and regional service deficiencies. The goal is to uncover actionable insights to mitigate churn risks and reduce revenue loss.

**Methodology**:

* **Excel Power Query**: Cleaned raw customer data (missing values, duplicates) and merged tables (demographics, usage patterns, etc).
* **SQL Analysis**: Leveraged SQL queries to segment and analyze the churn\_analysis dataset.
* **Python**: Analyzed risk factors (e.g., contract type, tech support) using Pandas and visualized geographical trends with Seaborn (e.g., churn rates by service type, etc.)
* **Key Metrics**: Calculated churn rates, revenue loss, average satisfaction scores, and service deficiency correlations.
* **Segmentation**: Grouped data by attributes like internet service type, online security status, payment methods, dependents, and geographic regions.

**Key Findings**:

1. **Internet Service & Security**:
   * Fiber optic users exhibited the highest churn rate (**~40%**), with **48%** of unsecured fiber optic customers churning.
   * Lack of online security doubled churn risks for both fiber optic and cable users.
2. **Payment Methods**:
   * Paperless billing (e.g., mailed checks, direct debit) correlated with higher churn rates (**lowest satisfaction scores**).
   * Customers using mailed checks showed the highest churn risk, likely due to billing accessibility issues.
3. **Demographics**:
   * Customers with dependents had a **moderate churn score**, suggesting limited impact on overall churn risk.
4. **Revenue Impact**:
   * Competitor-related churn categories contributed the highest revenue loss, indicating pricing or reliability issues.
5. **Regional Hotspots**:
   * Cities like **San Diego, Los Angeles, and San Francisco** had elevated churn rates due to service gaps (e.g., lack of device protection and tech support).

**Insights & Recommendations**:

* **Improve Service Quality**: Address reliability issues for fiber optic users and enhance tech support in high-churn regions.
* **Strengthen Security**: Promote online security features to reduce vulnerabilities.
* **Revise Billing Practices**: Simplify paperless billing processes and offer incentives for automated payment methods.
* **Competitor Analysis**: Investigate pricing strategies and service reliability to retain customers at risk of switching.

**Impact**:  
This analysis provides a data-driven foundation to prioritize retention strategies, reduce service gaps, and improve customer satisfaction, ultimately curbing revenue loss and enhancing long-term profitability.

**Churn Rate by Internet Service Type**

**Objective:-** Identify the churn percentage for each internet service type

Select type,internet\_service,count(\*) as total\_customers,

sum(case when churn='Yes' then 1 else 0 end) as churn\_count,

Round((sum(case when churn ='Yes' then 1 else 0 end)\*100/count(\*)),2) as churn\_rate

from churn\_analysis

group by 1,2

**Insight:-** From the above, it was identified that almost 40% of the calculated churn showcased that the highest churn is on the Fibre Optic internet service Type.

**Churn Rate by internet service type & online security**

**Objective**: Compare churn rates for internet service types, highlighting security vulnerabilities.

Select type,internet\_service,online\_security,count(\*) as total\_customers,

sum(case when churn='Yes' then 1 else 0 end) as churn\_count,

Round((sum(case when churn ='Yes' then 1 else 0 end)\*100/count(\*)),2) as churn\_rate

from churn\_analysis

where internet\_service <> 'No'

group by 1,2,3

order by 6 desc

**Insight:-** Reveals that 48 % and 36% of fibre optic and cable networks that have no online security are at a higher risk of exposure to network vulnerabilities and show a high churn as well

**Payment Method vs. Churn**

**Objective**: Analyze if payment type (e.g., paperless billing) impacts churn

Select payment\_type,paperless\_bill,count(\*) as total\_customers,

sum(case when churn ='Yes' then 1 else 0 end) as churn\_count,

round(avg(satisfaction),2) as avg\_satifaction,

Round(sum(case when churn ='Yes' then 1 else 0 end)\*100/count(\*),2) As churn\_rate

from churn\_analysis

where paperless\_bill <> 'No'

group by 1,2

order by 6 desc

**Insight:-** As far as the query it shows that payment types like mailed checks and direct debit payment methods have a higher churn rate, which means a higher risk. Hence, being paperless on bills has a high impact on churn as a factor. This is due to multiple reasons, which are no hard trail on amounts being paid as the bills are all online, and difficulty in accessing the online portal. Mailed check shows the highest risk with the lowest satisfaction

**Churn Risk by Dependents**

**Objective**: Determine if customers with dependents are less likely to churn.

Select dependents, count(no\_of\_dependents) as total\_dependents,

Round(avg(churn\_score),2) as avg\_churn,

round(sum(case when churn='Yes' then 1 else 0 end)\*100/count(\*),2) as Churn\_rate

from churn\_analysis

where dependents <> 'No'

group by 1

order by 4 desc

**Insight:-** Reveals a moderate churn score with a low churn rate, which suggests it has less of likely impact on churn risk.

**Top Churn Categories & Revenue Loss**

**Objective**: Quantify revenue loss from top churn categories (e.g., "Service Issues").

Select churn\_category,count (\*) as total\_churned,

Round(sum(revenue),2) as revenue\_loss,

Round(Avg(month\_charge),2) as avg\_month\_charge

from churn\_analysis

where churn\_category is not null and churn= 'Yes'

group by 1

order by 3 desc

**Insight:-** Reveals that most churned customers were coming under the competitor category, which could be high prices for unreliable service

**Regional Churn Hotspots & Service Vulnerabilities**

**Objective**: Identify states/cities with high churn rates and correlate them with service deficiencies (e.g., lack of device protection).

select city, count(\*) as Total\_customers,

Round(sum(case when churn ='Yes' then 1 else 0 end),2) as churn\_count,

Round(sum(case when churn='Yes' then 1 else 0 end)\*100/count(\*),2)as churn\_rate,

sum(case when device\_protection='No' then 1 else 0 end) as cx\_without\_DP,

Sum(Case when tech\_support ='No'then 1 else 0 end) as cx\_without\_TS

from churn\_analysis

group by 1

Order by 5 desc

limit 5

**Insight:-** Insight reveals the top 5 cities that have churn rates have service deficiencies like device protection and tech support. Which are San Diego, LA, Sacramento, San Francisco, and San Jose