In [39]:

```
import pandas as pd
```

In [40]:

```
import numpy as np
```

In [41]:

```
import matplotlib.pyplot as plt
```

In [42]:

```
import matplotlib.pyplot as plt
import seaborn as sns
```

In [43]:

```
import pandas as pd
```

In [44]:

```
import numpy as np
```

In [45]:

```
### Import data into Python environment
comcast = pd.read_csv('C:\\Python\\Projects\\1568699544_comcast_telecom_complaints_data\\co
```

In [46]:

```
comcast.head()
```

Out[46]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code
0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009
1	223441	Payment disappear - service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia	30102
2	242732	Speed and Service	18-04-15	18-Apr-15	9:55:47 AM	Internet	Acworth	Georgia	30101
3	277946	Comcast Imposed a New Usage Cap of 300GB that ...	05-07-15	05-Jul-15	11:59:35 AM	Internet	Acworth	Georgia	30101
4	307175	Comcast not working and no service to boot	26-05-15	26-May-15	1:25:26 PM	Internet	Acworth	Georgia	30101

In [47]:

```
comcast[comcast.isnull()].count()
```

Out[47]:

```
Ticket #                    0
Customer Complaint          0
Date                        0
Date_month_year             0
Time                        0
Received Via                0
City                        0
State                       0
Zip code                    0
Status                      0
Filing on Behalf of Someone 0
dtype: int64
```

In [48]:

```
comcast.describe(include='all')
```

Out[48]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Z
count	2224	2224	2224	2224	2224	2224	2224	2224	2224
unique	2224	1841	91	91	2190	2	928	43	
top	250635	Comcast	24-06-15	24-Jun-15	12:41:14 PM	Customer Care Call	Atlanta	Georgia	
freq	1	83	218	218	2	1119	63	288	
mean	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	47994
std	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	28885
min	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	1075
25%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	30056
50%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	37211
75%	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	77058
max	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	99223

In [49]:

```
# EDA and Cleanup the data set
comcast.info()
```

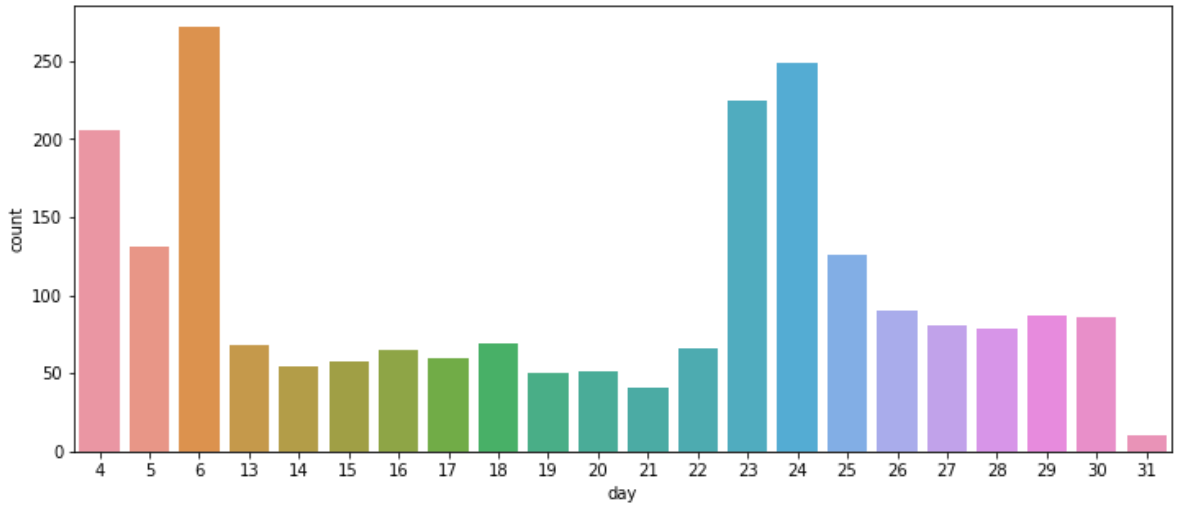
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2224 entries, 0 to 2223
Data columns (total 11 columns):
 #   Column                      Non-Null Count  Dtype
---  ------                      --------------  -----
 0   Ticket #                    2224 non-null   object
 1   Customer Complaint          2224 non-null   object
 2   Date                        2224 non-null   object
 3   Date_month_year             2224 non-null   object
 4   Time                        2224 non-null   object
 5   Received Via                2224 non-null   object
 6   City                        2224 non-null   object
 7   State                       2224 non-null   object
 8   Zip code                    2224 non-null   int64
 9   Status                      2224 non-null   object
 10  Filing on Behalf of Someone 2224 non-null   object
dtypes: int64(1), object(10)
memory usage: 191.2+ KB
```

In [50]:

```
import datetime
comcast.Date = pd.to_datetime(comcast.Date, format='%d-%m-%y')
```

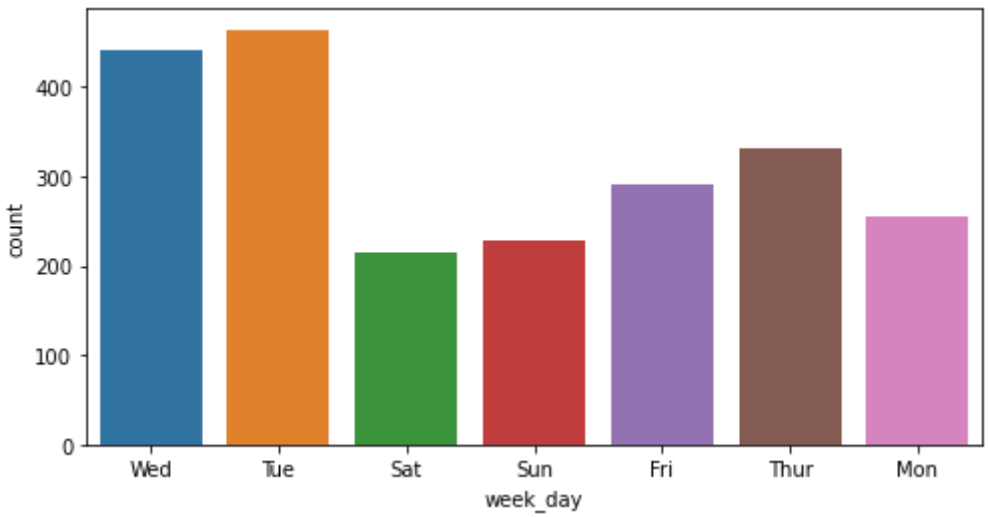
In [51]:

```
### Provide the trend chart for the number of complaints at monthly and daily granularity l
comcast['day'] = comcast['Date'].dt.day
plt.figure(figsize=(12,5))
sns.countplot(x="day", data=comcast);    # trend at daily granularity levels
# Maximum complaints are recieved on 6th day of month.
```



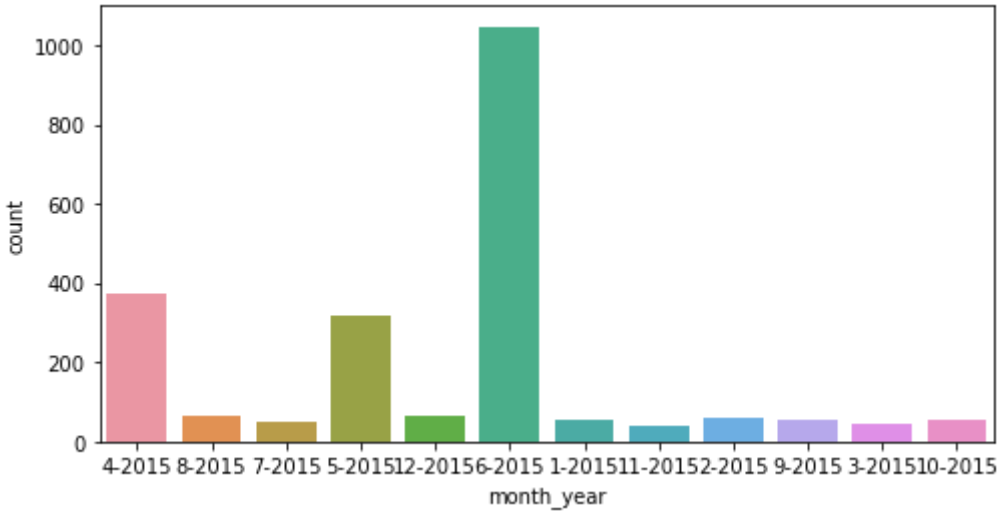
In [52]:

```
month = comcast['Date'].dt.month.astype(str)
year = comcast['Date'].dt.year.astype(str)
comcast['month_year']= month.str.cat(year, sep="-")
week_day = comcast['Date'].dt.dayofweek
dmap = {0:'Mon',1:'Tue',2:'Wed',3:'Thur',4:'Fri',5:'Sat',6:'Sun'}
comcast['week_day']= week_day.map(dmap)
plt.figure(figsize=(8,4))
sns.countplot(x="week_day", data=comcast);     # trend at week day granularity levels
# Maximum complaints are recieved on Tuesday and Wednesday
```



In [53]:

```
plt.figure(figsize=(8,4))
sns.countplot(x="month_year", data=comcast);      # trend at monthly granularity levels
# Maximum complaints are in June-2015 month
```



In [57]:

```
### Provide a table with the frequency of complaint types.
comcast['Customer Complaint'].str.lower().value_counts()
```

Out[57]:

```
comcast                                                              102
comcast data cap                                                      30
comcast internet                                                      29
comcast data caps                                                     21
comcast billing                                                       18
                                                                    ...
monthly data caps                                                      1
comcast/xfinity poor service, fraudulent billing and collection        1
lost emails/billing                                                    1
improper billing and non resolution of issues                          1
comcast, ypsilanti mi internet speed                                   1
Name: Customer Complaint, Length: 1740, dtype: int64
```

In [61]:

```
### Create a new categorical variable with value as Open and Closed. Open & Pending is to b
comcast['Status_Update'] = ["Open" if Status=="Open" or Status=="Pending" else "Closed" for
comcast['Status_Update'].unique()
```

Out[61]:

```
array(['Closed', 'Open'], dtype=object)
```

In [62]:

```
"""
Provide state wise status of complaints in a stacked bar chart. Use the categorized variabl
 - Which state has the maximum complaints
 - Which state has the highest percentage of unresolved complaints
"""
comcast['State'] = comcast['State'].str.title()
state_compl = comcast.groupby(['State','Status_Update']).size().unstack().fillna(0)
state_compl
```

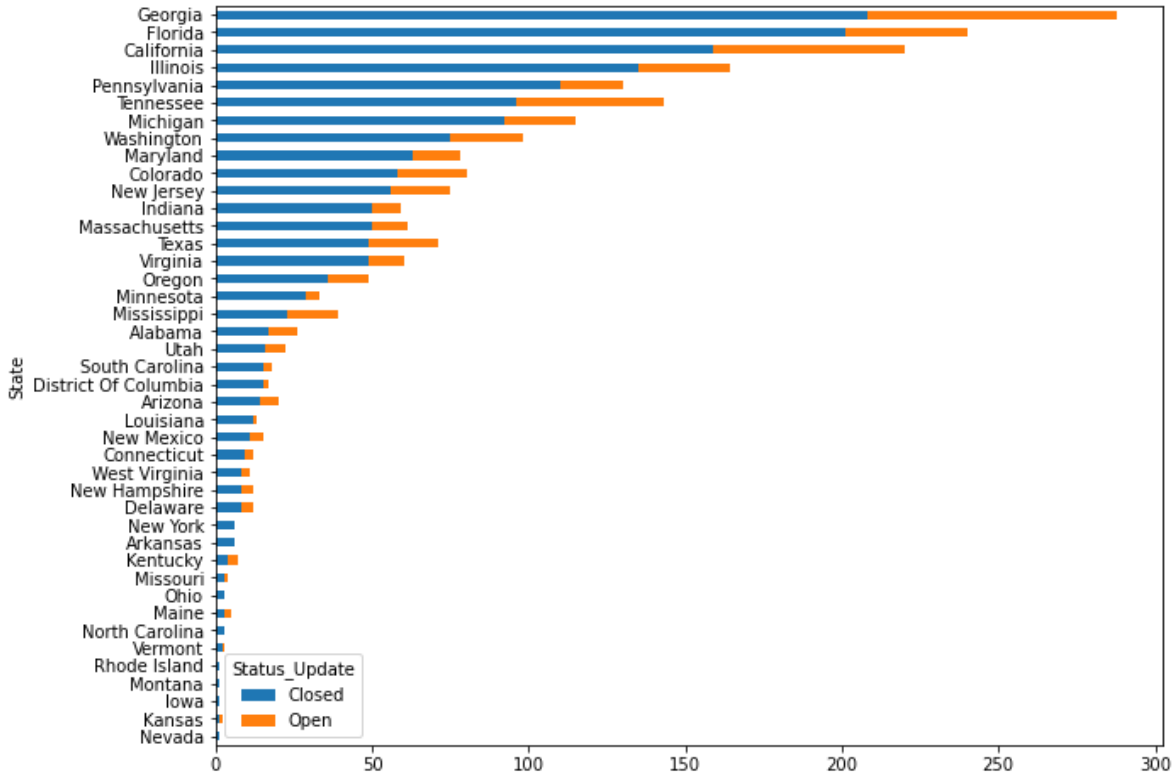
Out[62]:

Status_Update	Closed	Open
State		
Alabama	17.0	9.0
Arizona	14.0	6.0
Arkansas	6.0	0.0
California	159.0	61.0
Colorado	58.0	22.0
Connecticut	9.0	3.0
Delaware	8.0	4.0
District Of Columbia	15.0	2.0
Florida	201.0	39.0
Georgia	208.0	80.0
Illinois	135.0	29.0
Indiana	50.0	9.0
Iowa	1.0	0.0
Kansas	1.0	1.0
Kentucky	4.0	3.0
Louisiana	12.0	1.0
Maine	3.0	2.0
Maryland	63.0	15.0
Massachusetts	50.0	11.0
Michigan	92.0	23.0
Minnesota	29.0	4.0
Mississippi	23.0	16.0
Missouri	3.0	1.0
Montana	1.0	0.0
Nevada	1.0	0.0
New Hampshire	8.0	4.0
New Jersey	56.0	19.0
New Mexico	11.0	4.0
New York	6.0	0.0

Status_Update State	Closed	Open
North Carolina	3.0	0.0
Ohio	3.0	0.0
Oregon	36.0	13.0
Pennsylvania	110.0	20.0
Rhode Island	1.0	0.0
South Carolina	15.0	3.0
Tennessee	96.0	47.0
Texas	49.0	22.0
Utah	16.0	6.0
Vermont	2.0	1.0
Virginia	49.0	11.0
Washington	75.0	23.0
West Virginia	8.0	3.0

In [63]:

```
state_compl.sort_values('Closed',axis = 0,ascending=True).plot(kind="barh", figsize=(10,8),
```



In [64]:

```
state_compl['Total'] = state_compl['Open'] + state_compl['Closed']
state_compl.sort_values("Total", axis = 0, ascending = False)[:1]
# Georgia has highest complaints - 288
```

Out[64]:

Status_Update	Closed	Open	Total
State			
Georgia	208.0	80.0	288.0

In [65]:

```
state_compl['Perc_Unres'] = state_compl['Open']/ state_compl['Open'].sum()*100
state_compl.sort_values("Perc_Unres", axis = 0, ascending = False)[:1]
# Georgia state has highest Unresolved complaints compared to other states which is around
```

Out[65]:

Status_Update	Closed	Open	Total	Perc_Unres
State				
Georgia	208.0	80.0	288.0	15.473888

In [66]:

```
# Provide the percentage of complaints resolved till date, which were received through the
compl_res = comcast.groupby(['Received Via','Status_Update']).size().unstack().fillna(0)
compl_res['resolved'] = compl_res['Closed']/compl_res['Closed'].sum()*100
compl_res['resolved']
```

Out[66]:

```
Received Via
Customer Care Call    50.615114
Internet              49.384886
Name: resolved, dtype: float64
```

In [ ]:

```

```