In [1]:
```
# import required libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
import os
os.listdir()
```

Out[1]:
```
['.ipynb_checkpoints',
 'Comcast_telecom_complaints_data.csv',
 'Comcast_telecom_complaints_data.ipynb']
```

In [2]:
```
# read data set
df_comcast = pd.read_csv('Comcast_telecom_complaints_data.csv')
```

In [3]:
```
df_comcast.head()
```

Out[3]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone
0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No
1	223441	Payment disappear - service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No
2	242732	Speed and Service	18-04-15	18-Apr-15	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes
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	Open	Yes
4	307175	Comcast not working and no service to boot	26-05-15	26-May-15	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No

In [4]:
```
df_comcast.shape
```

Out[4]:
```
(2224, 11)
```

In [5]:
```
df_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 [6]:
```
df_comcast.describe()
```

Out[6]:

	Zip code
count	2224.000000
mean	47994.393435
std	28885.279427
min	1075.000000

25%	30056.500000
50%	37211.000000
75%	77058.750000
max	99223.000000

In [7]:
```
#check missing value
df_comcast.isnull().sum().sort_values(ascending=True)
```

Out[7]:
```
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
```

2.Provide the trend chart for the number of complaints at monthly and daily granularity levels.

In [8]:
```
df_comcast.dtypes
```

Out[8]:
```
Ticket #                      object
Customer Complaint            object
Date                          object
Date_month_year               object
Time                          object
Received Via                  object
City                          object
State                         object
Zip code                       int64
Status                        object
Filing on Behalf of Someone   object
dtype: object
```

In [9]:
```
# Add Date Month year with Time and save it into Date_Full
df_comcast['Date_full'] = df_comcast['Date_month_year']+ ' ' +df_comcast['Time']
```

In [10]:
```
df_comcast['Date_full']
```

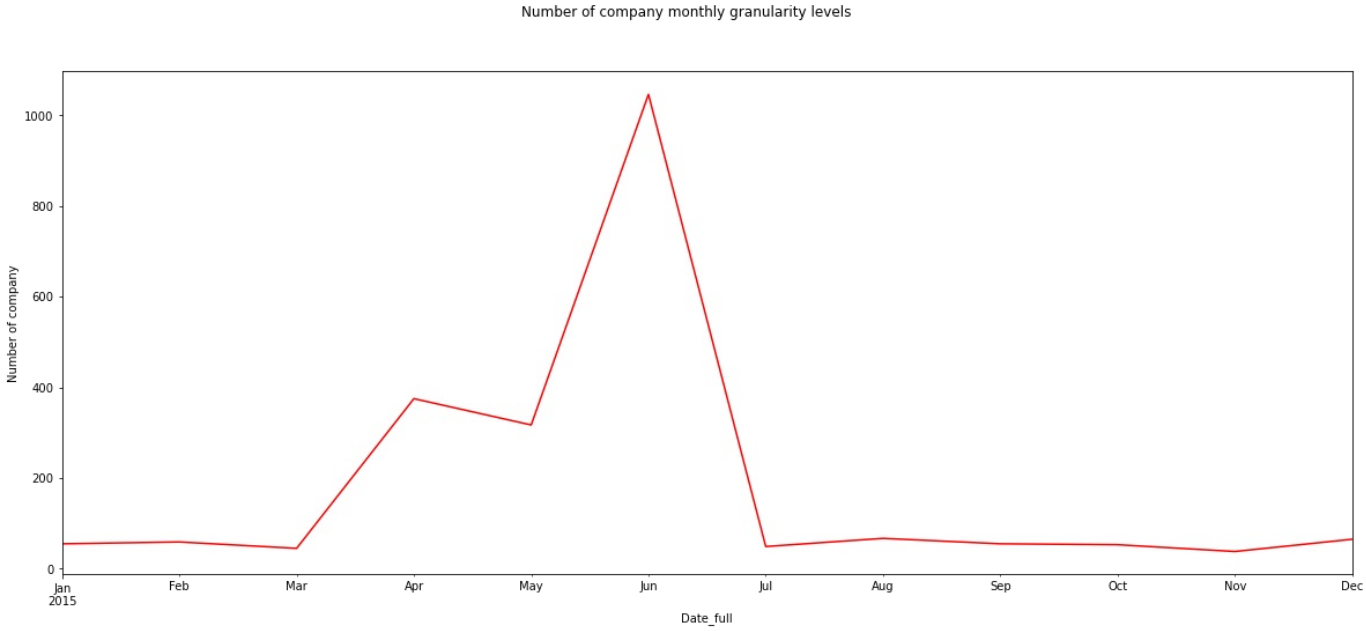
Out[10]:
```
0        22-Apr-15 3:53:50 PM
1       04-Aug-15 10:22:56 AM
2        18-Apr-15 9:55:47 AM
3       05-Jul-15 11:59:35 AM
4        26-May-15 1:25:26 PM
                ...
2219     04-Feb-15 9:13:18 AM
2220     06-Feb-15 1:24:39 PM
2221     06-Sep-15 5:28:41 PM
2222    23-Jun-15 11:13:30 PM
2223    24-Jun-15 10:28:33 PM
Name: Date_full, Length: 2224, dtype: object
```

In [11]:
```
#covert datetime format
df_comcast['Date_full'] = pd.to_datetime(df_comcast['Date_full'])
df_comcast['Date_month_year'] = pd.to_datetime(df_comcast['Date_month_year'])
comcast_tele_consumer_monthly = df_comcast.set_index(df_comcast["Date_full"])
```

In [12]:
```
# Provide the trend chart for the number of complaints at monthly granularity levels.
#Increase Graph Size
plt.figure(figsize=(20,8))
plt.suptitle("Number of company monthly granularity levels")
plt.ylabel('Number of company')
```

```
comcast_tele_consumer_monthly.groupby(pd.Grouper(freq="M")).size().plot(color='red')
```

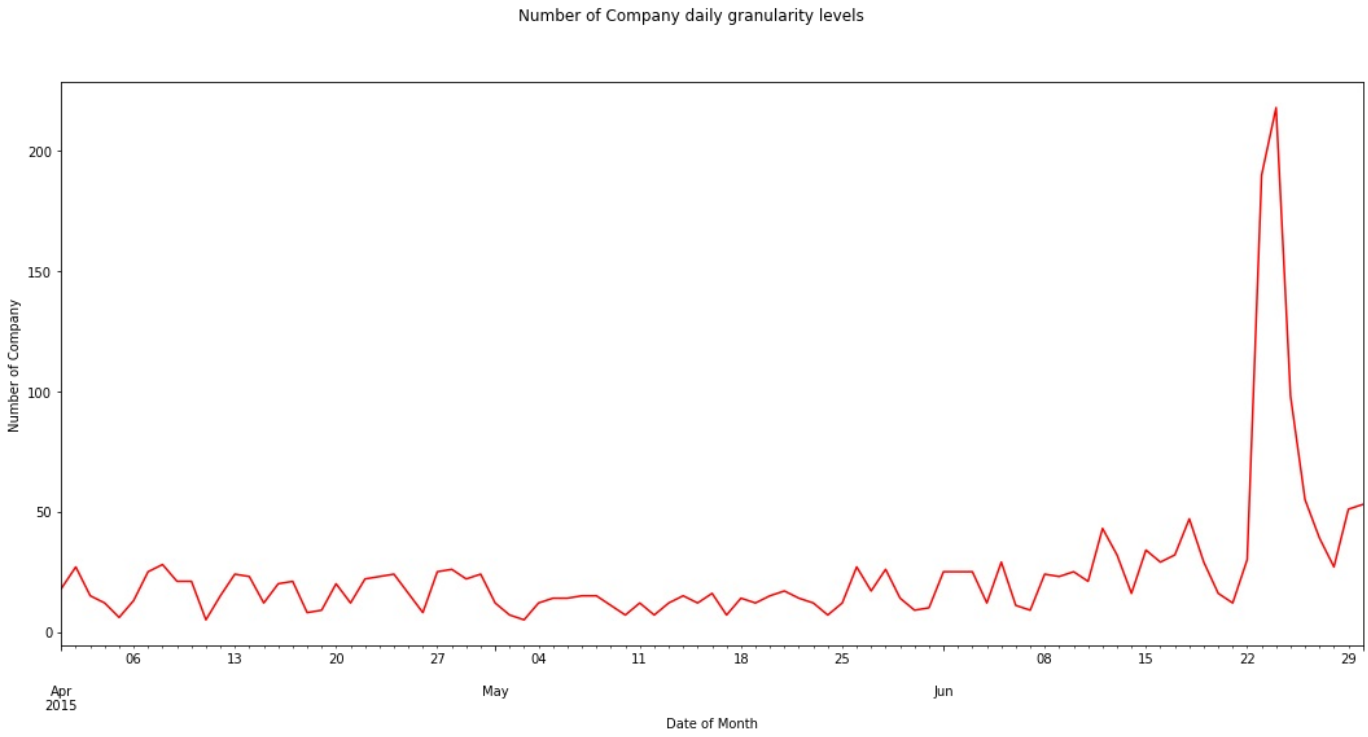
Out[12]: <AxesSubplot:xlabel='Date_full', ylabel='Number of company'>



In [13]:

```
# Provide the trend chart for the number of complaints at daily granularity levels.
df_comcast['Date of Month'] = pd.to_datetime(df_comcast['Date'])
comcast_tele_consumer_daily = df_comcast.set_index(df_comcast['Date of Month'])
# plot
plt.figure(figsize=(18,8))
plt.suptitle("Number of Company daily granularity levels")
plt.ylabel("Number of Company")
comcast_tele_consumer_daily.groupby(pd.Grouper(freq = "D")).size().plot(color='red')
```

Out[13]: <AxesSubplot:xlabel='Date of Month', ylabel='Number of Company'>



3. Provide a table with the frequency of complaint types.

In [14]:

```
# To get the frequency of complaint types first we have to see all complaint types and check for duplicate, case
# Incomplete data so that we can make analytics better
df_comcast_complain_type = df_comcast['Customer Complaint'].value_counts()
df_comcast_complain_type.head(10)
```

Out[14]:
```
Comcast                     83
Comcast Internet            18
Comcast Data Cap            17
comcast                     13
Comcast Billing             11
Data Caps                   11
Comcast Data Caps           11
Unfair Billing Practices     9
Comcast data cap             8
Comcast internet             8
Name: Customer Complaint, dtype: int64
```

In [15]:
```
# Better to convert all data into uper case or sentence case so duplicate value will shorted
df_comcast_complain_type_upper = df_comcast['Customer Complaint'].str.upper().value_counts()
df_comcast_complain_type_upper.head(25)
```

Out[15]:
```
COMCAST                            102
COMCAST DATA CAP                    30
COMCAST INTERNET                    29
COMCAST DATA CAPS                   21
COMCAST BILLING                     18
COMCAST SERVICE                     15
INTERNET SPEED                      15
UNFAIR BILLING PRACTICES            13
DATA CAPS                           13
DATA CAP                            12
COMCAST COMPLAINT                   11
COMCAST/XFINITY                     11
COMCAST INTERNET SERVICE            10
BILLING                              9
BILLING ISSUES                       8
COMCAST CABLE                        5
INTERNET                             5
COMCAST BILLING COMPLAINT            5
COMCAST ISSUES                       5
COMCAST BILLING PRACTICES            5
SERVICE ISSUES                       5
SLOW INTERNET                        5
INTERNET SERVICE                     5
COMPLAINT AGAINST COMCAST            5
COMCAST UNFAIR BILLING PRACTICES     4
Name: Customer Complaint, dtype: int64
```

4.Create a new categorical variable with value as Open and Closed.

Open & Pending is to be categorized as Open and Closed & Solved is to be categorized as Closed.

In [16]:
```
df_comcast['Status'].unique()
```

Out[16]:
```
array(['Closed', 'Open', 'Solved', 'Pending'], dtype=object)
```

In [17]:
```
# Convert as per Instruction (Task 4) into New Column without changing the main data so that we can use the main
# in Future
df_comcast['New Status'] = ["Open" if Status =='Open' or Status == 'Pending' else "Closed" for Status in df_comca
```

In [18]:
```
df_comcast['New Status'].unique()
```

Out[18]:
```
array(['Closed', 'Open'], dtype=object)
```

In [19]:
```
df_comcast_state_by_status = pd.crosstab(df_comcast.State,df_comcast['New Status'])
```

In [20]:
```
df_comcast_state_by_status
```

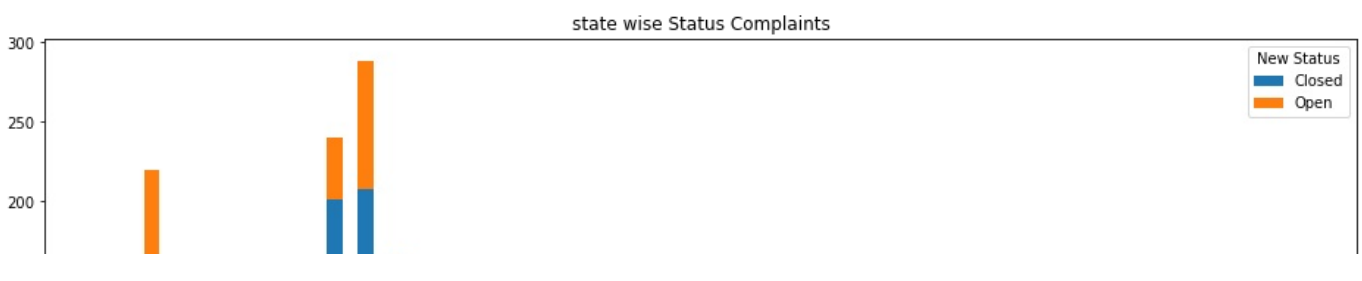
Out[20]:

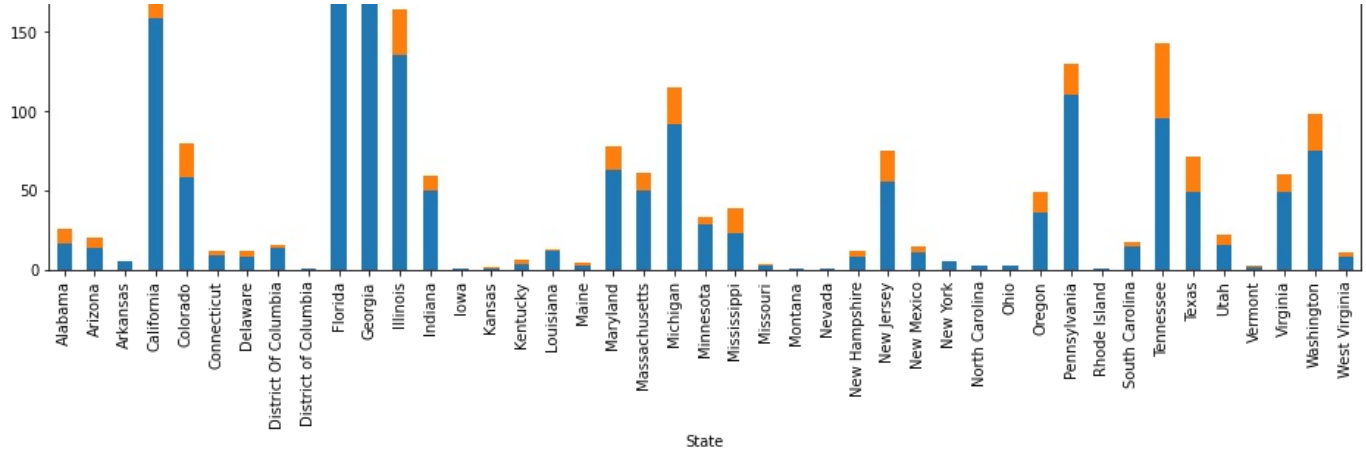
New Status	Closed	Open
State		

Alabama	17	9
Arizona	14	6
Arkansas	6	0
California	159	61
Colorado	58	22
Connecticut	9	3
Delaware	8	4
District Of Columbia	14	2
District of Columbia	1	0
Florida	201	39
Georgia	208	80
Illinois	135	29
Indiana	50	9
Iowa	1	0
Kansas	1	1
Kentucky	4	3
Louisiana	12	1
Maine	3	2
Maryland	63	15
Massachusetts	50	11
Michigan	92	23
Minnesota	29	4
Mississippi	23	16
Missouri	3	1
Montana	1	0
Nevada	1	0
New Hampshire	8	4
New Jersey	56	19
New Mexico	11	4
New York	6	0
North Carolina	3	0
Ohio	3	0
Oregon	36	13
Pennsylvania	110	20
Rhode Island	1	0
South Carolina	15	3
Tennessee	96	47
Texas	49	22
Utah	16	6
Vermont	2	1
Virginia	49	11
Washington	75	23
West Virginia	8	3

In [21]:
```
df_comcast_state_by_status.plot(kind = 'bar',figsize=(16,6),stacked=True,title="state wise Status Complaints")
```

Out[21]:
```
<AxesSubplot:title={'center':'state wise Status Complaints'}, xlabel='State'>
```





In [ ]:

5. Which state has the highest percentage of unresolved complaints

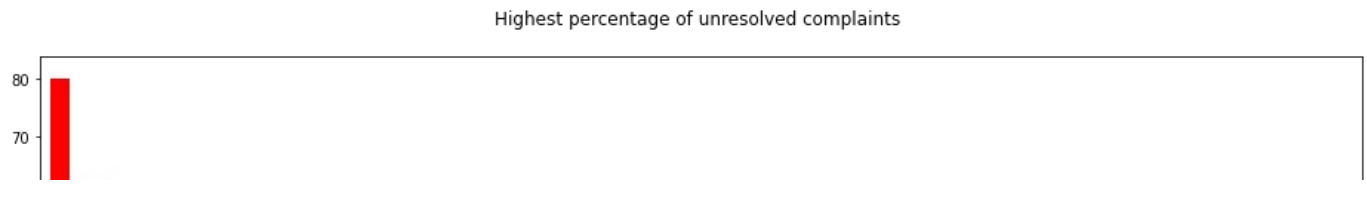
In [22]:
```
df_comcast_unsloved_complaint = df_comcast[df_comcast['New Status']=='Open']
```

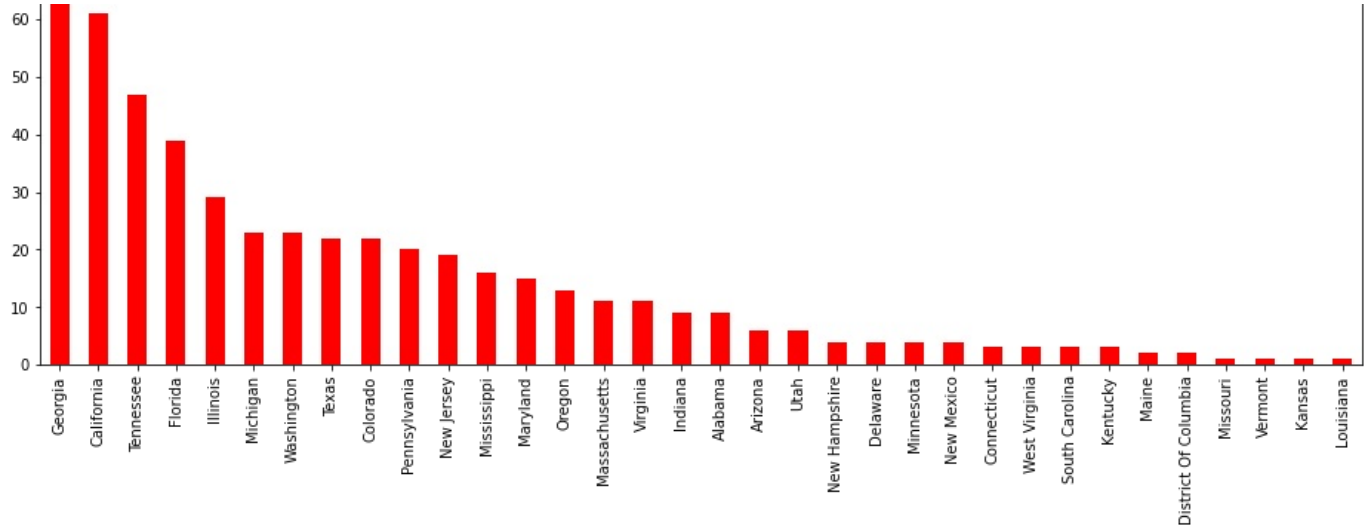
In [23]:
```
df_comcast_unsloved_complaint_value_count=df_comcast_unsloved_complaint['State'].value_counts()
df_comcast_unsloved_complaint_value_count
```

Out[23]:
```
Georgia                80
California             61
Tennessee              47
Florida                39
Illinois               29
Michigan               23
Washington             23
Texas                  22
Colorado               22
Pennsylvania           20
New Jersey             19
Mississippi            16
Maryland               15
Oregon                 13
Massachusetts          11
Virginia               11
Indiana                 9
Alabama                 9
Arizona                 6
Utah                    6
New Hampshire           4
Delaware                4
Minnesota               4
New Mexico              4
Connecticut             3
West Virginia           3
South Carolina          3
Kentucky                3
Maine                   2
District Of Columbia    2
Missouri                1
Vermont                 1
Kansas                  1
Louisiana               1
Name: State, dtype: int64
```

In [39]:
```
df_comcast_unsloved_complaint_value_count.plot(kind='bar',figsize=(16,6),color='red')
plt.title("Highest percentage of unresolved complaints \n")
```

Out[39]:
```
Text(0.5, 1.0, 'Highest percentage of unresolved complaints \n')
```





9. Provide the percentage of complaints resolved till date,

which were received through the Internet and customer care calls.

In [25]:
```
df_comcast['Received Via'].unique()
```

Out[25]:
```
array(['Customer Care Call', 'Internet'], dtype=object)
```

In [26]:
```
df_comcast['Received Via'].value_counts()
```

Out[26]:
```
Customer Care Call    1119
Internet              1105
Name: Received Via, dtype: int64
```

In [27]:
```
df_comcast['Received Via'].value_counts()/df_comcast['Received Via'].count()
```

Out[27]:
```
Customer Care Call    0.503147
Internet              0.496853
Name: Received Via, dtype: float64
```

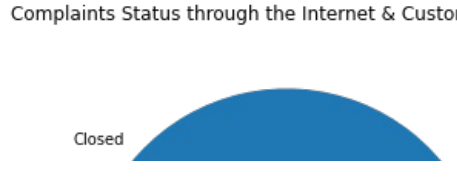
In [33]:
```
value = df_comcast['New Status'][df_comcast['Received Via']=='Internet'].value_counts()
```

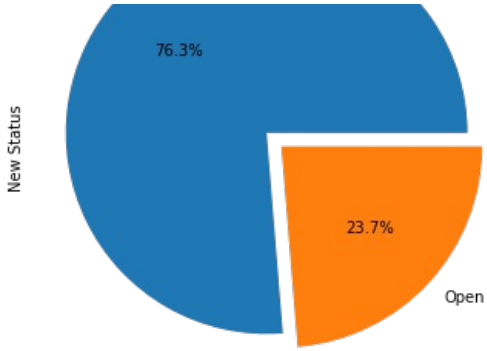
In [34]:
```
value
```

Out[34]:
```
Closed    843
Open      262
Name: New Status, dtype: int64
```

In [37]:
```
myexplode = [0.1, 0]
plt.title('Complaints Status through the Internet & Customer Care Calls\n')
df_comcast['New Status'][df_comcast['Received Via']=='Internet'].value_counts().plot(kind='pie',explode = myexplo
                         figsize = (14,6))
```

Out[37]:
```
<AxesSubplot:title={'center':'Complaints Status through the Internet & Customer Care Calls\n'}, ylabel='New Statu
s'>
```





In [ ]: