Project 4

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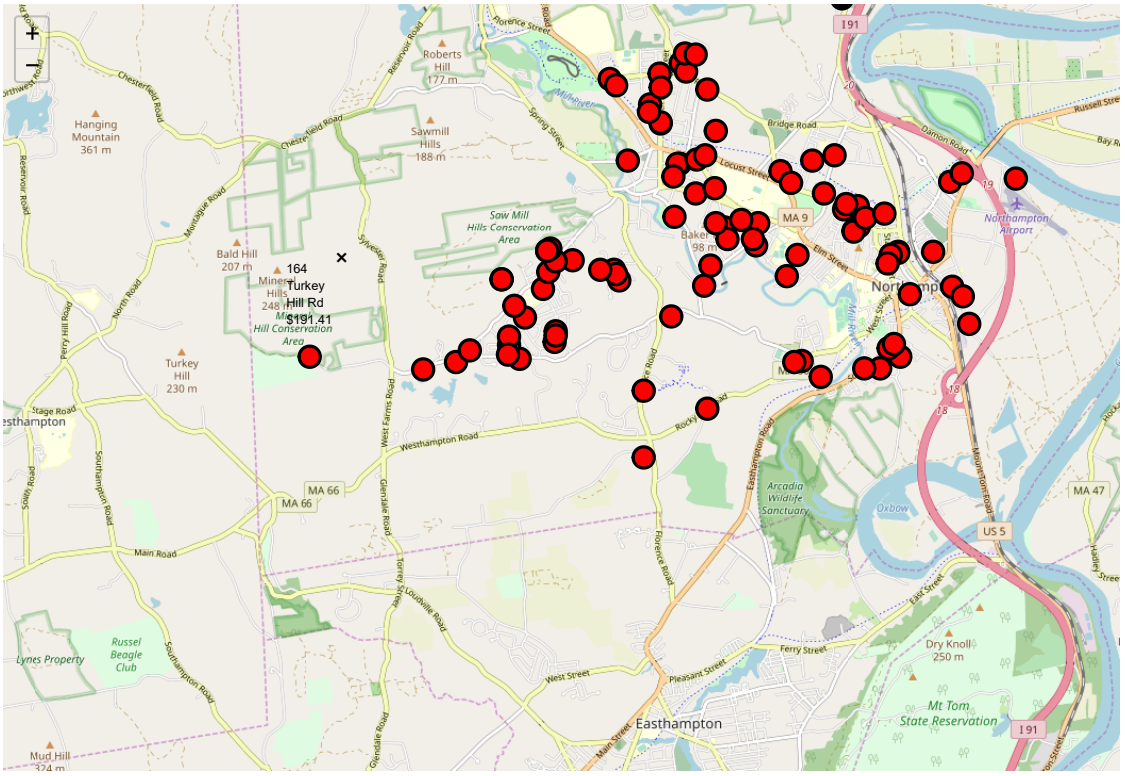
In [125]:
```
import folium
import plotly.graph_objs as go
from plotly.offline import download_plotlyjs, init_notebook_mode, plot, iplot
import plotly.plotly as py
import plotly.graph_objs as go
import plotly.figure_factory as ff
from plotly import tools

import numpy as np
import pandas as pd
init_notebook_mode(connected=True)
```

1) Load the housing_price.csv file and create the following map visualization with Folium.
a. The housing_price.csv spreadsheet include four columns: latitude, longitude, streetname, streetno, and price2014.
b. Place markers on a base map (OpenStreetMap). Each marker represents one house based on its latitude and longitude. Each marker should be a circle filled with red color and with a black line.
c. When the mouse cursor hovers over a marker, the streetno and streetname, and price2014 should be displayed in a tooltip.
d. Write your code in Jupyter Notebook. Submit the Jupyter Notebook and a PDF file with the figure.

In [126]:
```
df = pd.read_csv('Housing_price.csv')
m = folium.Map(location=[42.31533, -72.694], zoom_start=12)

df["text"] = df["streetno"].map(str) +' '+ df["streetname"] + ' $' + df['price2014'].round(2).map(str)
df.apply(lambda row:folium.CircleMarker(
    location=[row["latitude"], row["longitude"]],popup=row['text'],
    fill_color='red', color = 'black', fill_opacity='1').add_to(m),axis=1)
m
```

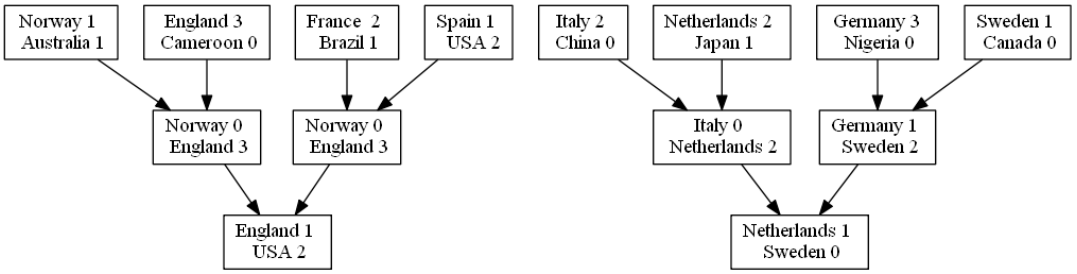
Out[126]:



Leaflet (http://leafletjs.com) | Data by © OpenStreetMap (http://openstreetmap.org), under ODbL (http://www.openstreetmap.org/copyright).

2. (Figure 2, 30 points) Create a network visualization of the 2019 Women's World Cup Bracket using GraphViz.
   a. Here are some examples
   i. https://www.fifa.com/womensworldcup/matches/ (https://www.fifa.com/womensworldcup/matches/)
   ii. http://www.espn.com/soccer/bracket/_/league/fifa.wwc (http://www.espn.com/soccer/bracket/_/league/fifa.wwc)
   b. Each node should contain the names of the countries and the score. National flags are optional.
   c. There must be edges with arrows pointing from one stage to the next.
   d. Submit the DOT script file and a PDF file of the figure.

The dot code from GraphWiz is in the zip file



3. (Figure 3, 35 points) Create a music collaboration network visualization using Plotly.
   a. Select 10 singers/musicians. For each musician, identify at least two collaborators and the songs they collaborated on. The more artists you include in your visualization the better.
   i. For example, Drake collaborated with Rihanna on “Work” and “What’s My Name?”, with Lil Wayne on “She Will”, etc.

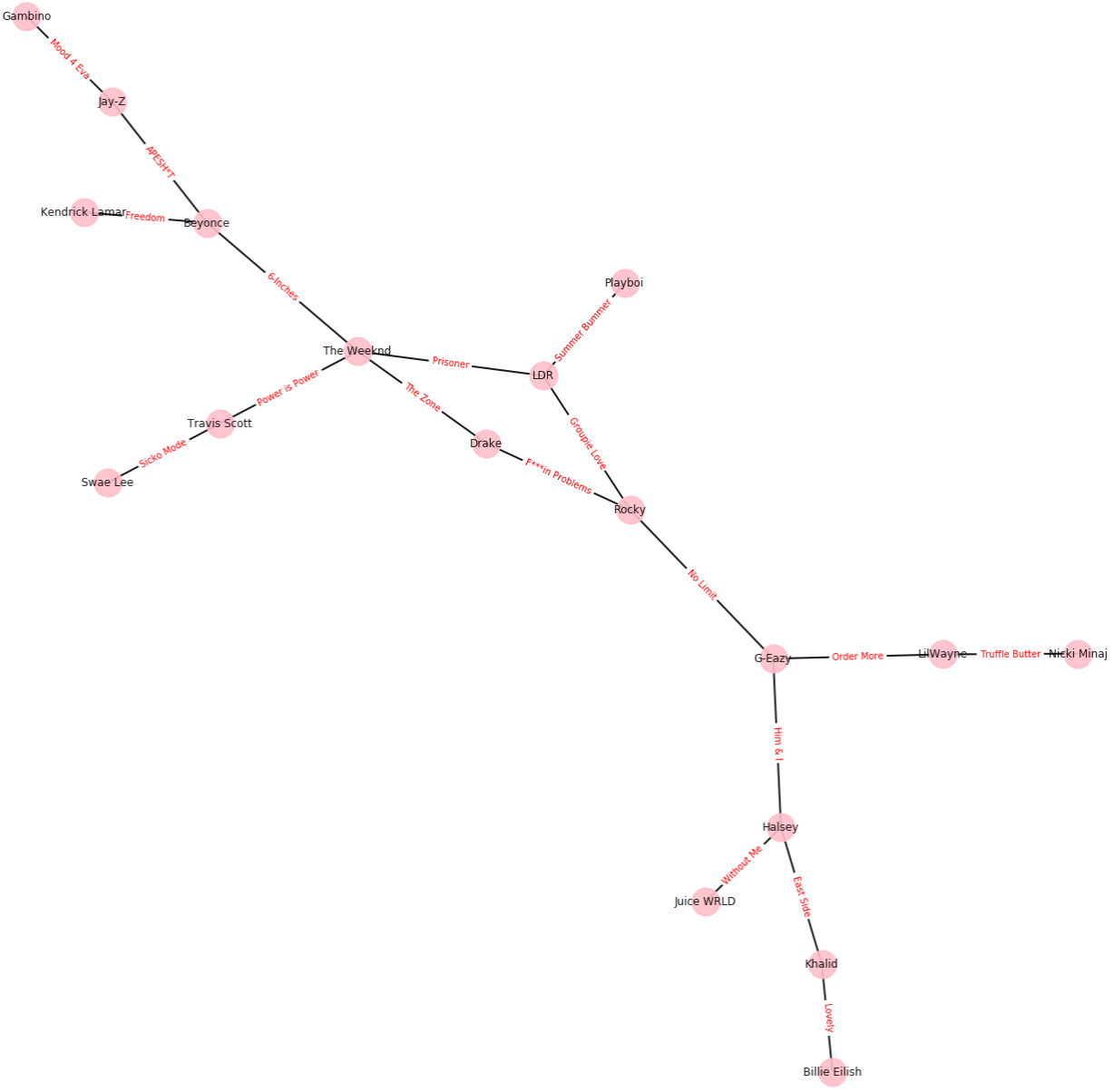
In [113]:
```
data = [('A$AP Rocky','Groupie Love','Playboi', "Summer Bummer"),
        ('Halsey',"Him and I","A$AP Rocky", "No Limit"),
        ('Jay-Z','APESH*T',"Kendrick Lamar", "Freedom"),
        ('Lana Del Rey','Prisoner',"Drake", "The Zone"),
        ('JuiceWRLD',"Without Me","Khalid", "East Side"),
        ('The Weeknd',"Power is Power","SwaeLee", "SickoMode"),
        ('G-Eazy',"Order More","Nicki Minaj", "Truffle Butter"),
        ('Beyonce',"APESH*T",'Childish Gambino',"Youth 4 Eva"),
        ('The Weeknd',"The Zone","A$AP Rocky", "F***in Problem"),
        ('Billie Eilish',"Lovely","Halsey", "East Side"),


       ]

col_names = ['Collab1', 'Song1', 'Collab2', 'Song2']
row_names = ['Lana Del Rey', 'G-Eazy', " Beyonce", "The Weeknd",
             'Halsey', 'Travis Scott', 'Lil Wayne', 'Jay-Z', "Drake", 'Khalid']

dt = pd.DataFrame.from_records(data, columns=col_names, index=row_names).reset_index()
dt = dt[['index', 'Collab1', 'Song1', 'Collab2','Song2']]
dt
```

Out[113]:

	index	Collab1	Song1	Collab2	Song2
0	Lana Del Rey	A$AP Rocky	Groupie Love	Playboi	Summer Bummer
1	G-Eazy	Halsey	Him and I	A$AP Rocky	No Limit
2	Beyonce	Jay-Z	APESH*T	Kendrick Lamar	Freedom
3	The Weeknd	Lana Del Rey	Prisoner	Drake	The Zone
4	Halsey	JuiceWRLD	Without Me	Khalid	East Side
5	Travis Scott	The Weeknd	Power is Power	SwaeLee	SickoMode
6	Lil Wayne	G-Eazy	Order More	Nicki Minaj	Truffle Butter
7	Jay-Z	Beyonce	APESH*T	Childish Gambino	Youth 4 Eva
8	Drake	The Weeknd	The Zone	A$AP Rocky	F***in Problem
9	Khalid	Billie Eilish	Lovely	Halsey	East Side

b. Create a network visualization of the collaborations.
i. Each node represents a musician with the name of the musician displayed.
ii. Each edge represents a collaboration between two musicians. The name of the song should be displayed next to the edge.
iii. If more than two musicians collaborated in a project, each musician should be connected to every other musician.
iv. If two musicians collaborated more than once, create multiple edges between them.
v. Pictures are optional.
vi. Here is an example of Jazz music collaboration network visualization: https://linkedjazz.org/network/ (https://linkedjazz.org/network/)

In [116]:
```
import networkx as nx
import matplotlib.pyplot as plt

edges=[['LDR','Rocky'],['LDR','Playboi'],['G-Eazy','Halsey'],['LDR','The Weeknd'], ['The Weeknd', 'Beyonce']
       ,['Beyonce', 'Jay-Z'], ['The Weeknd', 'Travis Scott'], ['Travis Scott', 'Swae Lee'], ['Drake', 'The Weeknd']
       ,['Beyonce', 'Kendrick Lamar'],['Halsey', 'Juice WRLD'],['G-Eazy','Rocky'], ['LilWayne', 'Nicki Minaj'],
       ['Drake', 'Rocky'], ['G-Eazy', 'LilWayne'], ['Halsey', 'Khalid'], ['Jay-Z', 'Gambino'],['Khalid', 'Billie Eilish']]

G=nx.Graph()
G.add_edges_from(edges)
pos = nx.spring_layout(G)
plt.figure(4,figsize=(18,18))
nx.draw(G,pos,edge_color='black',width=2,linewidths=2,\
node_size=900,node_color='pink',alpha=0.9,\
labels={node:node for node in G.nodes()})


nx.draw_networkx_edge_labels(G,pos,edge_labels={('LDR','Rocky'):'Groupie Love',\
('LDR','Playboi'):'Summer Bummer',('G-Eazy','Halsey'):'Him & I',('LDR','The Weeknd'):'Prisoner',
('The Weeknd', 'Beyonce'):'6-Inches',('Beyonce', 'Jay-Z'):'APESH*T',('The Weeknd', 'Travis Scott'):'Power is Power',
('Travis Scott', 'Swae Lee'):'Sicko Mode',('Drake', 'The Weeknd'):'The Zone',('Beyonce', 'Kendrick Lamar'):'Freedom',
('Halsey', 'Juice WRLD'):'Without Me',('G-Eazy','Rocky'):'No Limit',('LilWayne', 'Nicki Minaj'):'Truffle Butter',
('Halsey', 'Juice WRLD'):'Without Me',('G-Eazy','Rocky'):'No Limit',('G-Eazy', 'LilWayne'):'Order More',
('Drake', 'Rocky'):'F***in Problems',('Halsey', 'Khalid'):'East Side', ('Jay-Z', 'Gambino'):'Mood 4 Eva',
                                        ('Khalid', 'Billie Eilish'):'Lovely'},font_color='red')

plt.axis('off')
plt.show()
```



c. Create THREE visualizations with three different layout algorithms.

i. Some layout may not look good. It's OK. The goal is to let you experiment with different layouts and learn how to adjust layout parameters.

d. You can choose the style of the visualization.
e. You decide how to handle the data. You may hard code the data in the Python program or create a spreadsheet and load it into your program.
i. If you use a spreadsheet, make sure you submit the spreadsheet with your code and PDF file.

Here are 3 different Vizualizations of the data

In [122]:
```
edges=[['LDR','Rocky'],['LDR','Playboi'],['G-Eazy','Halsey'],['LDR','The Weeknd'], ['The Weeknd', 'Beyonce']
       ,['Beyonce', 'Jay-Z'], ['The Weeknd', 'Travis Scott'], ['Travis Scott', 'Swae Lee'], ['Drake', 'The Weeknd']
       ,['Beyonce', 'Kendrick Lamar'],['Halsey', 'Juice WRLD'],['G-Eazy','Rocky'], ['LilWayne', 'Nicki Minaj'],
       ['Drake', 'Rocky'], ['G-Eazy', 'LilWayne'], ['Halsey', 'Khalid'], ['Jay-Z', 'Gambino'],['Khalid', 'Billie Eilish']]

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('The Weeknd', 'Beyonce'):'G-Inches',('Beyonce', 'Jay-Z'):'APESH*T',('The Weeknd', 'Travis Scott'):'Power is Power',
('Travis Scott', 'Swae Lee'):'Sicko Mode',('Drake', 'The Weeknd'):'The Zone',('Beyonce', 'Kendrick Lamar'):'Freedom',
('Halsey', 'Juice WRLD'):'Without Me',('G-Eazy','Rocky'):'No Limit',('LilWayne', 'Nicki Minaj'):'Truffle Butter',
('Halsey', 'Juice WRLD'):'Without Me',('G-Eazy','Rocky'):'No Limit',('G-Eazy', 'LilWayne'):'Order More',
('Drake', 'Rocky'):'F***in Problems',('Halsey', 'Khalid'):'East Side', ('Jay-Z', 'Gambino'):'Mood 4 Eva',
                                        ('Khalid', 'Billie Eilish'):'Lovely'},font_color='red')

plt.axis('off')
plt.show()
```

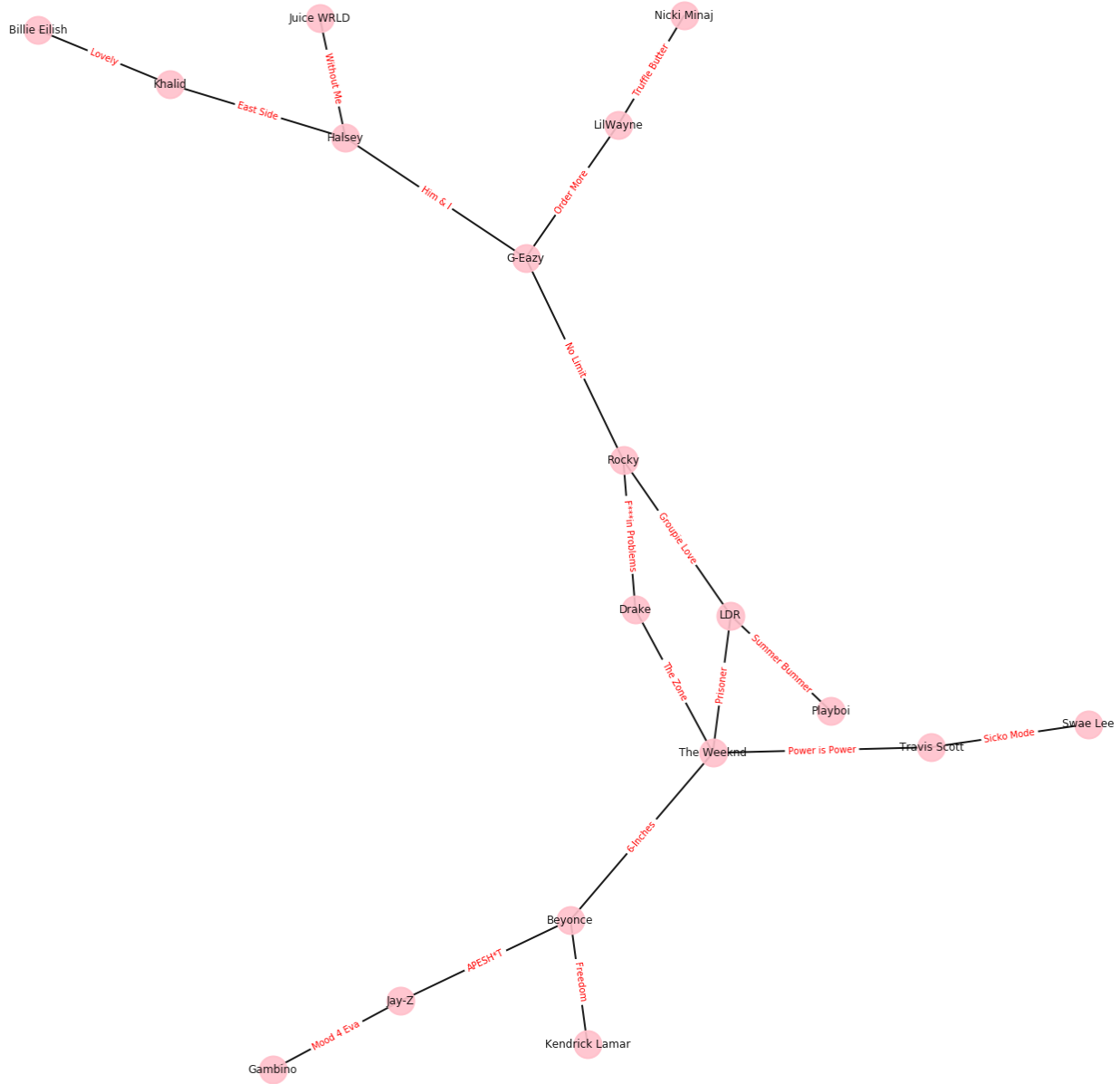

In [123]:
```
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       ,['Beyonce', 'Jay-Z'], ['The Weeknd', 'Travis Scott'], ['Travis Scott', 'Swae Lee'], ['Drake', 'The Weeknd']
       ,['Beyonce', 'Kendrick Lamar'],['Halsey', 'Juice WRLD'],['G-Eazy','Rocky'], ['LilWayne', 'Nicki Minaj'],
       ['Drake', 'Rocky'], ['G-Eazy', 'LilWayne'], ['Halsey', 'Khalid'], ['Jay-Z', 'Gambino'],['Khalid', 'Billie Eilish']]

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('The Weeknd', 'Beyonce'):'6-Inches',('Beyonce', 'Jay-Z'):'APESH*T',('The Weeknd', 'Travis Scott'):'Power is Power',
('Travis Scott', 'Swae Lee'):'Sicko Mode',('Drake', 'The Weeknd'):'The Zone',('Beyonce', 'Kendrick Lamar'):'Freedom',
('Halsey', 'Juice WRLD'):'Without Me',('G-Eazy','Rocky'):'No Limit',('LilWayne', 'Nicki Minaj'):'Truffle Butter',
('Halsey', 'Juice WRLD'):'Without Me',('G-Eazy','Rocky'):'No Limit',('G-Eazy', 'LilWayne'):'Order More',
('Drake', 'Rocky'):'F***in Problems',('Halsey', 'Khalid'):'East Side', ('Jay-Z', 'Gambino'):'Mood 4 Eva',
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plt.axis('off')
plt.show()
```

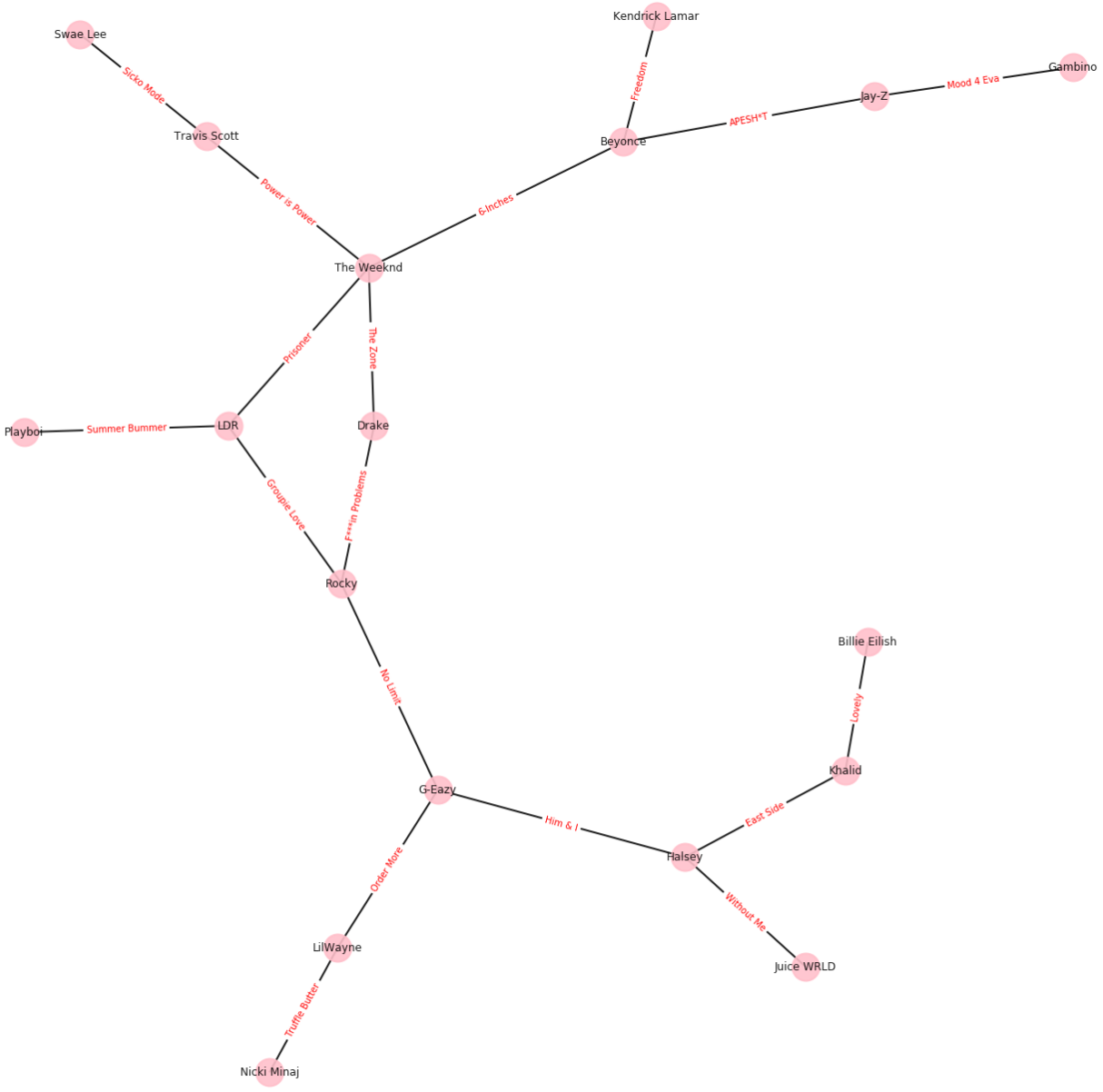

In [124]:
```
edges=[['LDR','Rocky'],['LDR','Playboi'],['G-Eazy','Halsey'],['LDR','The Weeknd'], ['The Weeknd', 'Beyonce']
       ,['Beyonce', 'Jay-Z'], ['The Weeknd', 'Travis Scott'], ['Travis Scott', 'Swae Lee'], ['Drake', 'The Weeknd']
       ,['Beyonce', 'Kendrick Lamar'],['Halsey', 'Juice WRLD'],['G-Eazy','Rocky'], ['LilWayne', 'Nicki Minaj'],
       ['Drake', 'Rocky'], ['G-Eazy', 'LilWayne'], ['Halsey', 'Khalid'], ['Jay-Z', 'Gambino'],['Khalid', 'Billie Eilish']]

G=nx.Graph()
G.add_edges_from(edges)
pos = nx.spring_layout(G)
plt.figure(4,figsize=(18,18))
nx.draw(G,pos,edge_color='black',width=2,linewidths=2,\
node_size=900,node_color='pink',alpha=0.9,\
labels={node:node for node in G.nodes()})


nx.draw_networkx_edge_labels(G,pos,edge_labels={('LDR','Rocky'):'Groupie Love',\
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('The Weeknd', 'Beyonce'):'6-Inches',('Beyonce', 'Jay-Z'):'APESH*T',('The Weeknd', 'Travis Scott'):'Power is Power',
('Travis Scott', 'Swae Lee'):'Sicko Mode',('Drake', 'The Weeknd'):'The Zone',('Beyonce', 'Kendrick Lamar'):'Freedom',
('Halsey', 'Juice WRLD'):'Without Me',('G-Eazy','Rocky'):'No Limit',('LilWayne', 'Nicki Minaj'):'Truffle Butter',
('Halsey', 'Juice WRLD'):'Without Me',('G-Eazy','Rocky'):'No Limit',('G-Eazy', 'LilWayne'):'Order More',
('Drake', 'Rocky'):'F***in Problems',('Halsey', 'Khalid'):'East Side', ('Jay-Z', 'Gambino'):'Mood 4 Eva',
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```

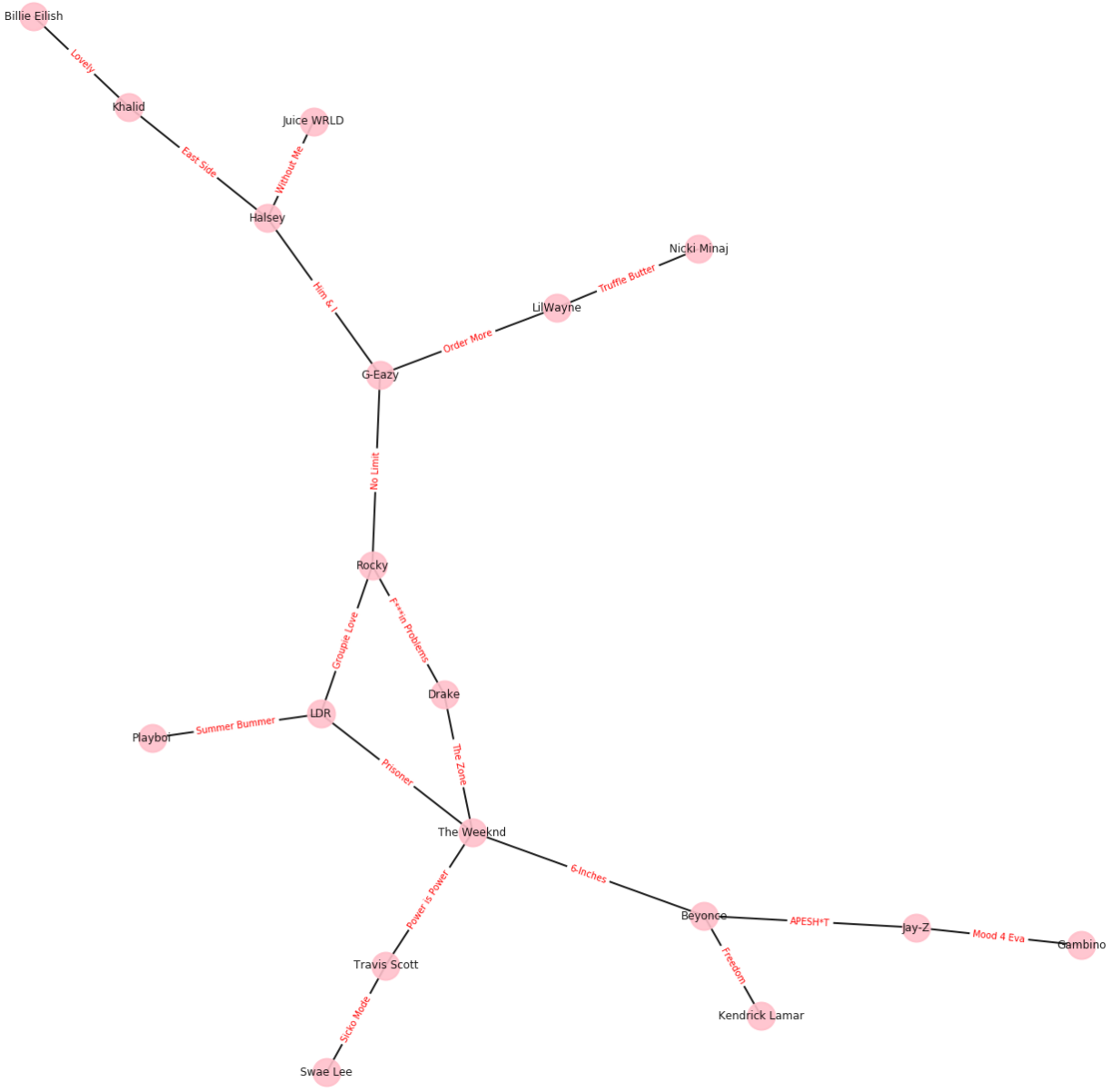

In [ ]: