Supplementary material

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1. Data description

A modified electrified road network [1] and power distribution network is used to illustrated the proposed methods. Figs. 1 and 2 show the modified road network and power network. As shown in Fig. 1, there is one type charger in each fast charging station. The green mark on charging links and generators represents this fast charging station and generator using renewable energy. The detail connections between charging links and buses are listed in Tab. 1. The parameters used in this paper are listed in Tab. 2. For simplicity, we assume there is one type EV and its battery capacity is 25 KWh and maximum energy level is 20. Total traffic demand is listed in Tab. 3. More detailed data of the studied road network and power network are uploaded on https://github.com/lucky105/Coordinating-dynamic-traffic-power-systems-under-decentralized-centralized-and-formation-sharing. Here we give a list of documents:

power_branch.csv: resistance, reactance and capacity of apparent power flow of each distribution line;

power_bus.csv: Lower and upper limits of voltage square at each bus;

power_generator.csv: Lower/upper limit of reactive power generation, lower/upper limit of active power generation, generation costs coefficients of each generator and contract price with main grid;

power_load_bus.csv: base load at each bus during each period;

traffic_DE.csv: traffic demand for electric vehicles with different initial energy during each period;

traffic_GE.csv: traffic demand for conventional vehicles during each period;

Table 1: Connections between charging links and Buses

Charging link	Bus
65	1
66	2
67	4
68	3
69	6
70	5
71	8
72	7

Table 2: Parameters

Parameters	Values
v_f (m/h)	50
k_{jam}(veh/m)	214
δ (min)	6
q_{max} (veh/h/lane)	2160
p_a^{ev} (KW)	50
η (KMh/mile)	0.25
ϕ (\$/h)	10
C	1
E_c	20
B_c (KWh)	25

traffic_If.csv: inflow capacity of each link during each period;

traffic_Of.csv: outflow capacity of each link during each period;

traffic_alpha_e.csv: charging speed at each charging link during each period;

traffic_links.csv: detailed profile of each link;

References

[1] W. Wei, L. Wu, J. Wang, S. Mei, Network equilibrium of coupled transportation and power distribution systems, IEEE Transactions on Smart Grid 9 (6) (2017) 6764–6779.
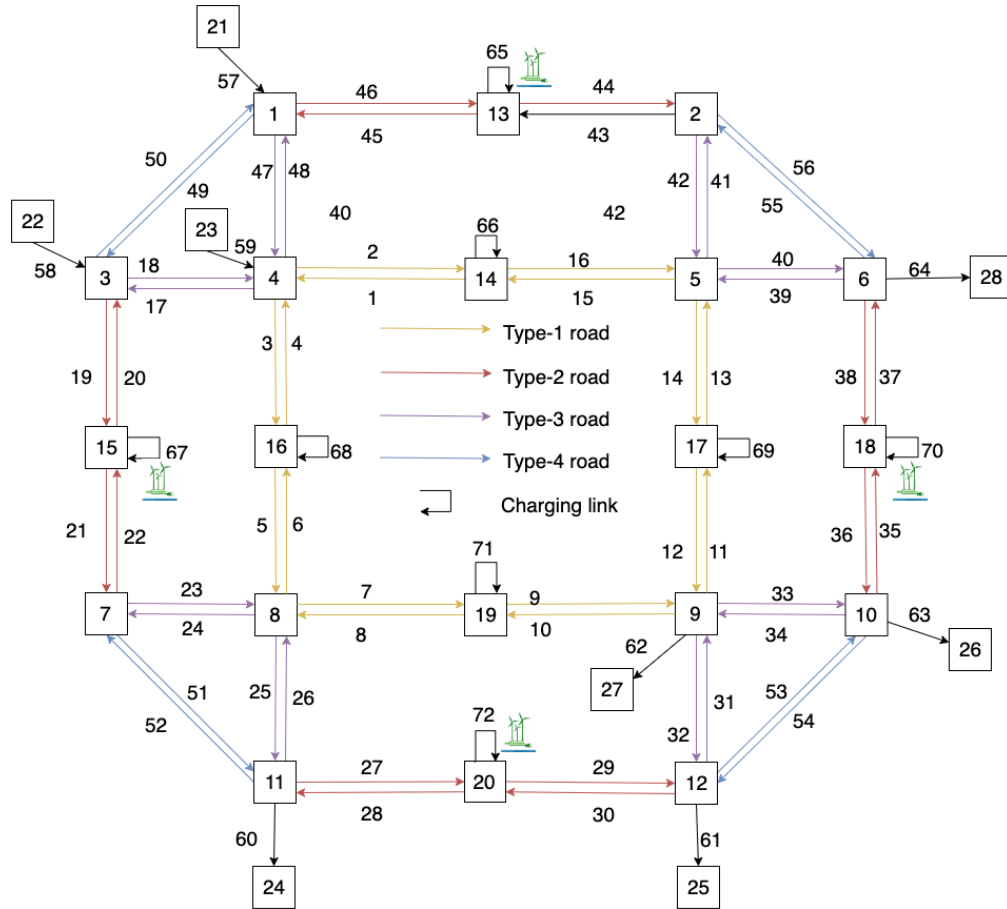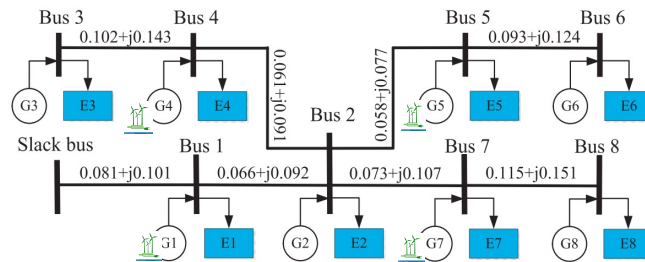
Figure 1: The studied electrified road network.

Figure 2: The studied Power distribution network.

Table 3: Traffic demand

O-D pair	Conventional vehicles	EV	O-D pair	Conventional vehicles	EV
21-28	30	15	22-28	30	15
21-26	60	30	22-26	50	25
21-24	40	20	22-24	40	20
21-25	40	20	22-25	50	25
23-27	50	15	23-26	40	20
23-25	40	20			