Supplementary Information

Supplementary Table 1

Table S1 presents experimental results with statistical analysis of the NPT–1 dataset. The prediction spans of {96, 288, 672, 1344, 2880} are aligned with {1, 3, 7, 14, 30} days, respectively. The average error (AE) indicates the mean errors of different prediction horizons, and the degradation rate (DR) in Table S1 indicates the daily increase rate of errors dMSE_1^{30} and dMAE_1^{30} from 1 to 30 days. The best predictive performance over the comparison is shown in bold.

Table S1: Time-series forecasting results on the 5G traffic network dataset.

Models		Diviner		Autoformer		Informer		Transformer		ARIMA		Prophet		NBeats		LSTMa	
Metric		MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE
NPT-1	96	**0.256**	**0.340**	0.456	0.511	0.264	0.349	0.259	0.333	0.401	0.487	0.456	0.531	0.491	0.509	1.778	1.092
	288	**0.277**	**0.379**	0.431	0.499	0.611	0.590	0.376	0.445	0.498	0.552	0.430	0.517	0.624	0.694	1.838	1.114
	672	**0.263**	**0.367**	0.446	0.522	1.680	0.885	0.365	0.437	0.754	0.674	0.437	0.520	0.680	0.615	1.786	1.103
	1344	**0.275**	**0.367**	0.400	0.467	1.307	0.923	0.448	0.462	1.558	0.914	0.459	0.532	0.883	0.692	1.843	1.115
	2880	**0.318**	**0.390**	0.674	0.629	1.590	1.050	0.811	0.652	5.522	1.632	0.550	0.576	1.257	0.844	2.251	1.221
AE		**0.277**	**0.368**	0.481	0.525	1.090	0.759	0.451	0.465	1.746	0.851	0.466	0.535	0.787	0.670	1.899	1.129
DR(%)		0.750	0.474	1.356	0.718	6.387	3.871	4.014	2.343	9.464	4.258	0.648	0.280	3.294	1.759	0.816	0.385

Supplementary Table 2

Table S2 presents the experimental results of WTH dataset with statistical analysis. The prediction span of {144, 432, 1008, 2016, 4032} is aligned with {1, 3, 7, 14, 28} days. The DR of Table S2 indicates the daily increase rate of errors dMSE_1^{28} and dMAE_1^{28} from 1 to 28 days in the WTH case. The best predictive performance over the comparison is shown in bold.

Table S2: Time-series forecasting results on WTH dataset

Models		Diviner		Autoformer		Informer		Transformer		ARIMA		Prophet		NBeats		LSTMa	
Metric		MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE
WTH	144	**0.280**	**0.341**	0.373	0.440	0.359	0.401	0.448	0.484	1.040	0.827	2.204	1.165	0.508	0.590	1.260	0.914
	432	**0.333**	**0.392**	0.402	0.445	0.374	0.431	0.407	0.470	1.019	0.813	2.025	1.109	0.427	0.501	1.208	0.890
	1008	**0.273**	**0.328**	0.663	0.613	0.344	0.387	0.535	0.514	0.921	0.780	1.572	0.980	0.406	0.490	1.194	0.885
	2016	**0.233**	**0.306**	1.857	1.019	0.367	0.417	0.367	0.417	1.022	0.840	1.246	0.833	0.757	0.635	1.220	0.900
	4032	**0.318**	**0.358**	1.016	0.853	1.251	0.806	0.876	0.616	0.506	0.555	1.757	1.130	0.361	0.434	1.051	0.846
AE		**0.287**	**0.345**	0.862	0.674	0.539	0.488	0.526	0.500	0.901	0.763	1.755	1.041	0.491	0.530	1.186	0.887
DR(%)		0.472	0.180	3.781	2.482	4.732	2.619	2.514	0.897	-2.633	-1.466	-0.836	-0.109	-1.257	-1.130	-0.669	-0.285

Supplementary Table 3

Table S3 summarizes the experiment results of different granularity ETT datasets including ETTm_1 for 15-minute levels and ETTh_1 for 1-hour levels. The prediction span {24, 48, 168} of ETTh_1 is aligned with the prediction span {96, 288, 672} of ETTm_1, and {1, 3, 7} in days. The granularity change (GC) indicates the relative performance varying when the hour-level granularity turns into the minute-level granularity. The best predictive performance over the comparison is shown in bold.

Table S3: Time-series forecasting results on ETT dataset

Models		Diviner		Autoformer		Informer		Transformer		ARIMA		Prophet		NBeats		LSTMa	
Metric		MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE
ETTh1	24	**0.058**	**0.183**	0.093	0.234	0.098	0.247	0.468	0.599	0.108	0.284	0.115	0.275	0.157	0.269	0.114	0.272
	48	**0.071**	**0.203**	0.089	0.229	0.158	0.319	0.369	0.524	0.175	0.424	0.168	0.330	0.146	0.292	0.193	0.358
	168	**0.199**	**0.262**	0.148	0.280	0.183	0.346	0.478	0.618	0.396	0.504	1.224	0.763	0.494	0.536	0.236	0.392
AE		**0.082**	**0.216**	0.110	0.247	0.146	0.304	0.438	0.580	0.226	0.404	0.502	0.456	0.265	0.365	0.181	0.340
ETTm1	96	**0.044**	**0.162**	0.063	0.198	0.194	0.372	0.264	0.450	0.273	0.399	0.194	0.396	1.352	1.106	0.287	0.420
	288	**0.078**	**0.209**	0.096	0.245	0.401	0.554	0.230	0.410	0.462	0.558	0.452	0.574	0.628	0.621	0.524	0.584
	672	**0.071**	**0.211**	0.117	0.276	0.512	0.644	0.379	0.540	0.639	0.697	2.747	1.174	0.361	0.480	1.064	0.873
AE		**0.064**	**0.194**	0.092	0.239	0.369	0.523	0.291	0.466	0.458	0.551	1.131	0.714	0.780	0.735	0.625	0.625
GC(×100%)		-0.219	-0.101	-0.163	-0.032	1.527	0.720	-0.335	-0.196	1.026	0.363	1.252	0.565	1.943	1.013	2.453	0.838

Supplementary Table 4

Table S4 presents the experimental results of the ECL dataset and conducts the analysis of short-term predictions of {7, 14} days / {168, 336} prediction spans and long-term predictions of {30, 40} days / {720, 960} prediction spans separately. The short term average error (STAE) calculates the mean errors of the prediction span of {168, 336} and long term average error (LTAE) calculates the mean errors of the prediction spans of {720, 960}. The DR in Table S4 represents the daily increase rate of errors dMSE_7^{40} and dMAE_7^{40} from 7 to 40 days in the ECL case. The best predictive performance over the comparison is shown in bold.

Table S4: Time-series forecasting results on ECL datasets

Models		Diviner		Autoformer		Informer		Transformer		ARIMA		Prophet		NBeats		LSTMa	
Metric		MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE
ECL	168	0.265	**0.361**	0.385	0.458	0.447	0.503	0.587	0.561	1.032	0.873	2.725	1.273	**0.225**	0.363	0.723	0.655
	336	0.295	0.395	0.462	0.496	0.489	0.528	0.683	0.640	1.136	0.876	2.246	3.077	**0.237**	**0.359**	1.212	0.898
	720	**0.303**	**0.409**	1.349	0.907	0.540	0.571	0.482	0.527	1.251	0.933	4.243	1.415	0.367	0.482	1.511	0.966
	960	**0.427**	**0.489**	1.263	0.920	0.582	0.608	0.644	0.597	1.370	0.982	6.901	4.264	0.457	0.540	1.545	1.006
DR(%)		1.456	0.923	3.665	2.136	0.802	0.576	0.281	0.188	0.862	0.357	2.855	3.731	2.170	1.210	2.327	1.308
STAE		0.280	0.378	0.423	0.477	0.468	0.515	0.635	0.600	1.084	0.874	2.485	2.175	**0.231**	**0.361**	0.967	0.776
LTAE		**0.365**	**0.449**	1.306	0.913	0.561	0.589	0.563	0.562	1.310	0.957	5.572	2.839	0.412	0.511	1.528	0.986

Supplementary Table 5

Table S5 presents the experimental results of the Exchange dataset. The prediction span of {10, 20, 30, 60} is aligned with {10, 20, 30, 60} days. The DR here represents the daily increase rate of errors $\mathrm{dMSE}_{10}^{60}, \mathrm{dMAE}_{10}^{60}$ from 10 to 60 days in the Exchange case. The best predictive performance over the comparison is shown in bold.

Table S5: Time-series forecasting results on Exchange dataset

Models		Diviner		Autoformer		Informer		Transformer		ARIMA		Prophet		NBeats		LSTMa	
Metric		MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE
Exchange	10	**0.147**	**0.282**	0.163	0.315	4.896	2.124	6.926	2.553	0.395	0.514	2.005	1.088	0.804	0.701	20.748	4.479
	20	**0.273**	**0.421**	0.423	0.540	6.318	2.443	6.759	2.524	0.740	0.774	2.087	1.122	1.166	0.939	21.239	4.541
	30	**0.399**	**0.506**	0.857	0.799	5.388	2.253	7.307	2.635	0.874	0.869	2.172	1.155	1.521	1.105	22.021	4.626
	60	**0.619**	**0.669**	0.911	0.776	9.886	3.067	8.455	2.840	2.285	1.357	2.505	1.315	3.299	1.670	23.261	4.762
AE		**0.359**	**0.469**	0.588	0.607	6.622	2.471	7.361	2.638	1.073	0.878	2.141	1.153	1.697	1.103	21.817	4.602
DR(%)		2.917	1.742	3.501	1.819	1.415	0.737	0.399	0.213	3.572	1.960	0.444	0.376	2.863	1.751	0.228	0.122

Supplementary Table 6

Table S6 shows the experimental results on the Solar dataset. We set the prediction horizon to {1, 2, 5, 6} days, aligned with {144, 288, 720, 864} prediction steps ahead. In Table S6, the average MASE error (AE) indicates the model's comprehensive performances under different prediction horizon settings. The best predictive performance over the comparison is shown in bold. By sorting their comprehensive performances, we have the following results: Diviner >NBeats >Transformer >Autoformer >Informer >LSTMa.

Table S6: Time-series forecasting results on Solar datasets

Models		Diviner	Autoformer	Informer	Transformer	ARIMA	Prophet	NBeats	LSTMa
Metric		MASE	MASE	MASE	MASE	MASE	MASE	MASE	MASE
Solar	144	**7.461**	11.091	8.290	11.742	31.093	29.165	8.487	18.917
	288	**8.355**	12.035	10.007	9.289	34.362	32.236	8.988	20.327
	720	**8.793**	13.497	13.803	11.352	35.099	32.930	9.176	21.886
	960	**7.053**	14.423	21.299	11.367	32.419	30.415	8.488	20.030
AE		**7.915**	12.761	13.349	10.937	33.243	31.186	8.784	20.290

Supplementary Table 7

Table S7 presents the experimental results of the Traffic dataset, and the prediction spans of {168, 336, 720, 960} is aligned with {7, 14, 30, 40} days. The DR in Table S7 presents the daily increase rate of errors $\mathrm{dMSE}_7^{40}, \mathrm{dMAE}_7^{40}$ from 7 to 40 days in the Traffic case. The best predictive performance over the comparison is shown in bold.

Table S7: Time-series forecasting results on Traffic dataset

Models		Diviner		Autoformer		Informer		Transformer		ARIMA		Prophet		NBeats		LSTMa	
Metric		MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE	MSE	MAE
Traffic	168	**0.156**	**0.259**	0.431	0.485	1.814	1.159	0.750	0.644	1.181	0.918	1.169	0.919	0.509	0.528	1.963	1.202
	336	**0.158**	**0.261**	0.437	0.477	1.799	1.153	0.629	0.573	1.182	0.919	1.169	0.918	0.517	0.529	2.007	1.214
	720	**0.318**	**0.437**	0.4	0.525	1.817	1.15	0.671	0.604	1.187	0.92	1.177	0.92	0.526	0.533	2.06	1.226
	960	**0.277**	**0.397**	0.546	0.607	1.821	1.165	1.950	1.116	1.194	0.922	1.185	0.921	0.523	0.532	1.975	1.204
AE		**0.227**	**0.338**	0.453	0.523	1.812	1.156	1.000	0.734	1.186	0.919	1.175	0.919	0.518	0.530	2.001	1.211
DR(%)		1.755	1.302	0.719	0.682	0.011	0.015	2.937	1.680	0.033	0.013	0.041	0.006	0.082	0.022	0.018	0.005