

# MRF Quality Report

s3://talon-storage-private/mrf-feed-uploads/

2025-10/2025-06-30\_Providence\_Health\_Plan\_7a6ee337f134b678ce55f314e2dd8a51\_in-network-rates.json.gz

Size: 11.48 GB • MD5: cecce4ff6d6fd10c7be5bb504a20c48a

Payer: **Providence\_Health\_Plan** • File Date: **2025-06-30** • Generated: **2026-04-25 08:19 EDT** • Tool Version: **1.0.0** •

Elapsed: **28116.70s**

# 65.0

Limited Reliability

score capped at 65.0 — CMS official schema validation failed (see meta for details)

Errors: 3 • Warnings: 13 • Info: 3

## TOC Plan References

TOC: s3://talon-storage-private/mrf-feed-uploads/2025-10/2025-10-15\_Providence-Health-Plan-Master\_combine\_index.json • Providence Health Plan (Health Plan)

Canonical: s3://talon-storage-private/mrf-feed-uploads/2025-10/2025-06-30\_Providence\_Health\_Plan\_7a6ee337f134b678ce55f314e2dd8a51\_in-network-rates.json.gz

Plan Name	Plan ID	Issuer / Sponsor	Market
OPTIONADV_PLUS_XPPO	471872443 (EIN)	—	group
OPTIONADV_PLUS_XPPO	461919298 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931043127 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930931601 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930504742 (EIN)	—	group
OPTIONADV_PREM_XPPO	930466199 (EIN)	—	group
HSA_XPPO	930659412 (EIN)	—	group
HSA_XPPO	931221257 (EIN)	—	group
HSA_XPPO	264110171 (EIN)	—	group
OPTIONADV_PLUS_XPPO	472616205 (EIN)	—	group
OPTIONADV_PREM_XPPO	930819125 (EIN)	—	group

Plan Name	Plan ID	Issuer / Sponsor	Market
OPTIONADV_PLUS_XPPO	932892944 (EIN)	—	group
HSA_XPPO	454254609 (EIN)	—	group
HSA_XPPO	931233407 (EIN)	—	group
OPTIONADV_PLUS_XPPO	521998212 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931324279 (EIN)	—	group
OPTIONADV_PLUS_XPPO	202532188 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931280180 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931272326 (EIN)	—	group
OPTIONADV_PREM_XPPO	931210029 (EIN)	—	group
HSA_XPPO	271283181 (EIN)	—	group
HSA_E_XPPO	881403196 (EIN)	—	group
OPTIONADV_PREM_XPPO	251059306 (EIN)	—	group
OPTIONADV_PLUS_XPPO	710883860 (EIN)	—	group
OPTIONADV_PLUS_XPPO	475271873 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931017343 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930978241 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930792627 (EIN)	—	group
HSA_XPPO	201598829 (EIN)	—	group
HSA_XPPO	930113905 (EIN)	—	group
HSA_XPPO	464529202 (EIN)	—	group
HSA_E_XPPO	251059306 (EIN)	—	group
HSA_XPPO	930764156 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931161382 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931154091 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930721833 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930572369 (EIN)	—	group
OPTIONADV_PLUS_XPPO	911755106 (EIN)	—	group
OPTIONADV_PREM_XPPO	931283205 (EIN)	—	group
OPTIONADV_PREM_XPPO	930887929 (EIN)	—	group

Plan Name	Plan ID	Issuer / Sponsor	Market
HSA_XPPO	930623130 (EIN)	—	group
HSA_XPPO	930332159 (EIN)	—	group
OPTIONADV_PLUS_XPPO	475355616 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931254448 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930905585 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930612582 (EIN)	—	group
HSA_XPPO	930753926 (EIN)	—	group
HSA_XPPO	930960920 (EIN)	—	group
OPTIONADV_BASE_XPPO	900463816 (EIN)	—	group
OPTIONADV_PLUS_XPPO	461618388 (EIN)	—	group
OPTIONADV_PLUS_XPPO	453960543 (EIN)	—	group
OPTIONADV_PLUS_XPPO	390552328 (EIN)	—	group
OPTIONADV_PLUS_XPPO	261932063 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930847903 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930771417 (EIN)	—	group
OPTIONADV_PREM_XPPO	881403196 (EIN)	—	group
OPTIONADV_PREM_XPPO	710870520 (EIN)	—	group
HSA_XPPO	920191915 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930462679 (EIN)	—	group
TRADITIONAL_OPTION	930882588 (EIN)	—	group
OPTIONADV_PLUS_XPPO	205230500 (EIN)	—	group
OPTIONADV_PLUS_XPPO	843616587 (EIN)	—	group
OPTIONADV_PLUS_XPPO	823042390 (EIN)	—	group
OPTIONADV_PLUS_XPPO	270599775 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931233407 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931138371 (EIN)	—	group
OPTIONADV_PREM_XPPO	936001547 (EIN)	—	group
OPTIONADV_PREM_XPPO	931236647 (EIN)	—	group
OPTIONADV_PREM_XPPO	930468003 (EIN)	—	group

Plan Name	Plan ID	Issuer / Sponsor	Market
OPTIONADV_PREM_XPPO	521998212 (EIN)	—	group
HSA_XPPO	261439370 (EIN)	—	group
HSA_XPPO	471325069 (EIN)	—	group
HSA_XPPO	931163998 (EIN)	—	group
HSA_XPPO	931072607 (EIN)	—	group
HSA_XPPO	205230500 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930887929 (EIN)	—	group
HSA_E_XPPO	930613912 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931286637 (EIN)	—	group
OPTIONADV_BASE_XPPO	930506597 (EIN)	—	group
OPTIONADV_PLUS_XPPO	473286927 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930557208 (EIN)	—	group
OPTIONADV_PREM_XPPO	930753926 (EIN)	—	group
OPTIONADV_PREM_XPPO	930592325 (EIN)	—	group
HSA_XPPO	202532188 (EIN)	—	group
HSA_XPPO	932686114 (EIN)	—	group
HSA_XPPO	931235599 (EIN)	—	group
OPTIONADV_PREM_XPPO	931048238 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931163998 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930764156 (EIN)	—	group
OPTIONADV_PREM_XPPO	936002174 (EIN)	—	group
OPTIONADV_PREM_XPPO	930960920 (EIN)	—	group
OPTIONADV_PREM_XPPO	930613912 (EIN)	—	group
OPTIONADV_PREM_XPPO	930550553 (EIN)	—	group
OPTIONADV_PREM_XPPO	813428954 (EIN)	—	group
HSA_XPPO	930904663 (EIN)	—	group
OPTIONADV_PREM_XPPO	930332159 (EIN)	—	group
HSA_E_XPPO	931283205 (EIN)	—	group
HSA_E_XPPO	930592325 (EIN)	—	group

Plan Name	Plan ID	Issuer / Sponsor	Market
OPTIONADV_PLUS_XPPO	202021091 (EIN)	—	group
OPTIONADV_PLUS_XPPO	273993713 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931154108 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930877643 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930659412 (EIN)	—	group
OPTIONADV_PLUS_XPPO	911767940 (EIN)	—	group
OPTIONADV_PLUS_XPPO	901255624 (EIN)	—	group
HSA_XPPO	930931601 (EIN)	—	group
HSA_XPPO	930504742 (EIN)	—	group
HSA_XPPO	475355616 (EIN)	—	group
HSA_XPPO	931357619 (EIN)	—	group
OPTIONADV_PREM_XPPO	930771417 (EIN)	—	group
OPTIONADV_PLUS_XPPO	454254609 (EIN)	—	group
OPTIONADV_PLUS_XPPO	301199483 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931124806 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930905634 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930887968 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930386839 (EIN)	—	group
OPTIONADV_PREM_XPPO	936002207 (EIN)	—	group
HSA_XPPO	823435338 (EIN)	—	group
HSA_XPPO	542131314 (EIN)	—	group
HSA_XPPO	475271873 (EIN)	—	group
HSA_E_XPPO	473286927 (EIN)	—	group
OPTIONADV_PLUS_XPPO	205021417 (EIN)	—	group
OPTIONADV_PLUS_XPPO	202993890 (EIN)	—	group
OPTIONADV_PLUS_XPPO	874159136 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930860004 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930631398 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930579560 (EIN)	—	group

Plan Name	Plan ID	Issuer / Sponsor	Market
HSA_XPPO	464380258 (EIN)	—	group
HSA_XPPO	930847903 (EIN)	—	group
HSA_XPPO	930978241 (EIN)	—	group
OPTIONADV_PREM_XPPO	473286927 (EIN)	—	group
HSA_E_XPPO	930887929 (EIN)	—	group
OPTIONADV_PLUS_XPPO	274363029 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930113905 (EIN)	—	group
OPTIONADV_PLUS_XPPO	900335202 (EIN)	—	group
HSA_XPPO	301199483 (EIN)	—	group
HSA_XPPO	270599775 (EIN)	—	group
HSA_XPPO	930386839 (EIN)	—	group
HSA_XPPO	900580910 (EIN)	—	group
HSA_XPPO	931138371 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930593858 (EIN)	—	group
OPTIONADV_PREM_XPPO	933264786 (EIN)	—	group
HSA_E_XPPO	710870520 (EIN)	—	group
OPTIONADV_BASE_XPPO	931357619 (EIN)	—	group
OPTIONADV_PLUS_XPPO	931235599 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930954075 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930801200 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930667344 (EIN)	—	group
OPTIONADV_PLUS_XPPO	930625068 (EIN)	—	group
OPTIONADV_PLUS_XPPO	920865029 (EIN)	—	group
OPTIONADV_PREM_XPPO	931054889 (EIN)	—	group
HSA_XPPO	461919298 (EIN)	—	group
HSA_XPPO	930721833 (EIN)	—	group
HSA_XPPO	930550553 (EIN)	—	group
HSA_XPPO	911755106 (EIN)	—	group
OPTIONADV_PLUS_XPPO	205746631 (EIN)	—	group

Plan Name	Plan ID	Issuer / Sponsor	Market
OPTIONADV_BASE_XPPO	930882588 (EIN)	—	group
OPTIONADV_PLUS_XPPO	845069167 (EIN)	—	group
OPTIONADV_PLUS_XPPO	813237603 (EIN)	—	group
OPTIONADV_PREM_XPPO	931129077 (EIN)	—	group
OPTIONADV_PREM_XPPO	873920649 (EIN)	—	group
HSA_XPPO	931324279 (EIN)	—	group
OPTIONADV_PREM_XPPO	930609882 (EIN)	—	group

## CMS Official Schema Validation

**FAILED** (exit code -1) — File does not conform to the CMS schema.

Validator output:

Timed out after 600 s

## Dimension Scores

Dimension	Score	Weight	Findings
Schema Integrity	<b>70.0</b>	30%	4
Provider Mapping	<b>100.0</b>	15%	4
Code Coverage	<b>89.5</b>	15%	2
Pricing Sanity	<b>58.9</b>	40%	9

## Schema Integrity — Findings

---

Score: 70.0

**ERROR** `file_freshness`

File is 299 days old (last\_updated\_on exceeds the 90-day threshold)

---

**WARNING** `item_required_fields`

0.01% of in\_network items are missing required fields

---

**WARNING** `expired_prices`

66204591 negotiated\_prices have past expiration dates (8.2%)

---

**ERROR** `cms_schema_validation`

CMS official schema validator FAILED (exit code -1). File does not conform to the TIC in-network-rates schema.

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## Provider Mapping — Findings

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Score: 100.0

**WARNING** `npi_validity`

0.01% of NPIs failed Luhn checksum validation (6 of 116709)

- 1336588484
- 1659650617

---

**WARNING** `ein_validity`

0.30% of EINs failed IRS prefix validation (191 of 62915)

- 000000001
- 001625898
- 003360711
- 003680161
- 004829723
- ... and 5 more

---

**WARNING** `empty_npi_groups`

53 provider groups contain no NPIs

---

**INFO** `duplicate_npis`

36714 NPIs appear in more than one provider group

---

# Code Coverage — Findings

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Score: 89.5

**WARNING** unknown\_billing\_code\_types

Unrecognized billing\_code\_type values: {'PROC': 1}

---

**WARNING** billing\_code\_format

3924 CPT codes do not match expected format

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## Pricing Sanity — Findings

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Score: 58.9

**INFO** `per_diem_rates`

19082 per-diem rates (0.0%) — not dollar amounts; excluded from spread analysis

**INFO** `percentage_rates`

1253415 percentage rates (0.2%) — values represent % of a reference rate, not dollar amounts; excluded from spread analysis

**ERROR** `zero_rates`

69066 zero-dollar rates (0.01%) — CMS schema requires `negotiated_rate > 0` (`exclusiveMinimum`)

**WARNING** `extreme_rates`

1.94% of rates are extreme (15610403 above class-specific high threshold, 0 below \$0.01)

**WARNING** `high_frequency_rate_value`

1 rate value(s) appear with suspiciously high frequency ( $\geq 0.5\%$  of dollar rates and  $\geq 50$  occurrences) — likely placeholder/sentinel values rather than real negotiated rates.

- `{'rate': 2250000.0, 'count': 10910191, 'pct': 1.36}`

**WARNING** `rate_spread_by_class`

`billing_class='professional' / negotiated_type='fee schedule':` P95/P50 spread is 6.7x (threshold: 5x, N=773,641,571 (1,000 sampled), high confidence)

**WARNING** `rate_spread_by_class`

`billing_class='institutional' / negotiated_type='negotiated':` P95/P50 spread is 2849.8x (threshold: 10x, N=80,718 (1,000 sampled), high confidence)

**WARNING** `rate_spread_by_class`

`billing_class='professional' / negotiated_type='negotiated':` P95/P50 spread is 4151.7x (threshold: 5x, N=164,276 (1,000 sampled), high confidence)

---

**WARNING** per\_code\_rate\_spread

9123 rate contexts have a max/min ratio exceeding the type-specific threshold (20x professional / 50x facility, min 3 occurrences required). Each context is a unique combination of all 10 rate-key dimensions. n= shows how many distinct provider rates exist for that exact context.

Code	Code Type	Neg. Type	Billing Class	Arrangement	Setting	Min	Median	Mean	Max	Ratio	n
A9699	HCPCS	fee schedule	professional	ffs	—	\$0.01	\$0.01	\$300000.01	\$2400000.00	240000000.0x	8
90296	CPT	fee schedule	professional	ffs	—	\$0.01	\$2400000.00	\$1834615.39	\$2400000.00	240000000.0x	13
90666	CPT	fee schedule	professional	ffs	—	\$0.01	\$2400000.00	\$1834615.39	\$2400000.00	240000000.0x	13
90667	CPT	fee schedule	professional	ffs	—	\$0.01	\$2400000.00	\$1834615.39	\$2400000.00	240000000.0x	13
90393	CPT	fee schedule	professional	ffs	—	\$0.01	\$2400000.00	\$1834615.39	\$2400000.00	240000000.0x	13
90758	CPT	fee schedule	professional	ffs	—	\$0.01	\$2400000.00	\$1834615.39	\$2400000.00	240000000.0x	13
90664	CPT	fee schedule	professional	ffs	—	\$0.01	\$2400000.00	\$1834615.39	\$2400000.00	240000000.0x	13
90676	CPT	fee schedule	professional	ffs	—	\$0.01	\$363.60	\$280902.23	\$2400000.00	240000000.0x	85
90399	CPT	fee schedule	professional	ffs	—	\$0.01	\$0.01	\$930000.01	\$2400000.00	240000000.0x	5
90668	CPT	fee schedule	professional	ffs	—	\$0.01	\$2400000.00	\$1834615.39	\$2400000.00	240000000.0x	13

## Recommended Actions

1. **schema** file\_freshness P1

File is 299 days old (last\_updated\_on exceeds the 90-day threshold)

2. **schema** cms\_schema\_validation P1

CMS official schema validator FAILED (exit code -1). File does not conform to the TIC in-network-rates schema.

3. **pricing** zero\_rates P1

69066 zero-dollar rates (0.01%) — CMS schema requires negotiated\_rate > 0 (exclusiveMinimum)

4. **provider\_mapping** `npi_validity`

P2

0.01% of NPIs failed Luhn checksum validation (6 of 116709)

5. **provider\_mapping** `ein_validity`

P2

0.30% of EINs failed IRS prefix validation (191 of 62915)

6. **provider\_mapping** `empty_npi_groups`

P2

53 provider groups contain no NPIs

7. **pricing** `extreme_rates`

P2

1.94% of rates are extreme (15610403 above class-specific high threshold, 0 below \$0.01)

8. **pricing** `high_frequency_rate_value`

P2

1 rate value(s) appear with suspiciously high frequency ( $\geq 0.5\%$  of dollar rates and  $\geq 50$  occurrences) — likely placeholder/sentinel values rather than real negotiated rates.

9. **pricing** `rate_spread_by_class`

P2

billing\_class='professional' / negotiated\_type='fee schedule': P95/P50 spread is 6.7x (threshold: 5x, N=773,641,571 (1,000 sampled), high confidence)

10. **pricing** `rate_spread_by_class`

P2

billing\_class='institutional' / negotiated\_type='negotiated': P95/P50 spread is 2849.8x (threshold: 10x, N=80,718 (1,000 sampled), high confidence)

11. **pricing** `rate_spread_by_class`

P2

billing\_class='professional' / negotiated\_type='negotiated': P95/P50 spread is 4151.7x (threshold: 5x, N=164,276 (1,000 sampled), high confidence)

12. **pricing** per\_code\_rate\_spread

P2

9123 rate contexts have a max/min ratio exceeding the type-specific threshold (20x professional / 50x facility, min 3 occurrences required). Each context is a unique combination of all 10 rate-key dimensions. n= shows how many distinct provider rates exist for that exact context.

13. **schema** item\_required\_fields

P2

0.01% of in\_network items are missing required fields

14. **schema** expired\_prices

P2

66204591 negotiated\_prices have past expiration dates (8.2%)

15. **code\_coverage** unknown\_billing\_code\_types

P3

Unrecognized billing\_code\_type values: {'PROC': 1}

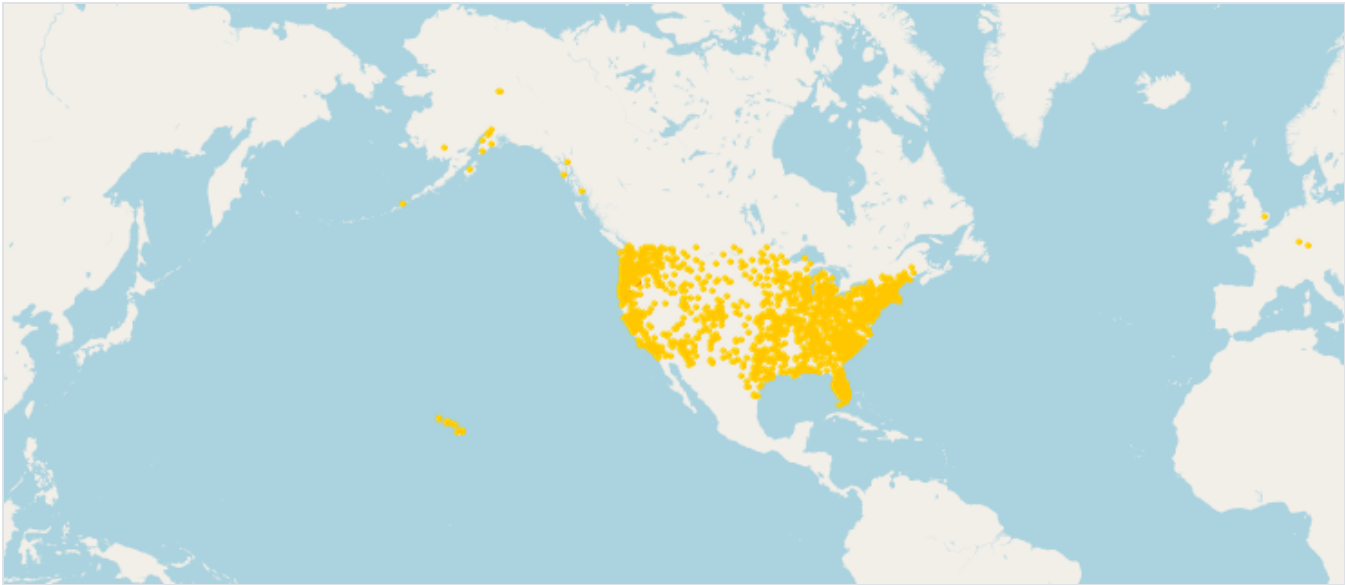
16. **code\_coverage** billing\_code\_format

P3

3924 CPT codes do not match expected format

## Provider Geographic Coverage

41591 unique NPIs found — 41374 geocoded (99%) — 4891 zip codes represented.



## Schema Integrity — Metrics

header_missing_fields		
header_conditional_issues		
file_age_days	299	
items_total	26125	
items_missing_required_pct	0.008	
items_empty_rates	0	
prices_total	805736626	
prices_missing_required_pct	0.0	
prices_missing_field_breakdown		
prices_missing_service_code	0	
prices_invalid_billing_class	0	
rates_without_providers	0	
negotiation_arrangements	ffs	26125

billing_code_types	HCPCS	7812
	CPT	15112
	CDT	939
	MS-DRG	818
	APC	877
	RC	566
	PROC	1
expired_prices	66204591	
invalid_expiration_format	0	

## Provider Mapping — Metrics

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provider_references_in_file	50553
provider_group_ids_referenced	47691
unresolved_references	0
resolution_rate_pct	100.0
npis_validated	116709
invalid_npi_count	6
npi_validity_rate_pct	99.99
invalid_npi_examples	1336588484, 1336588484, 1336588484, 1659650617, 1659650617, 1659650617
eins_validated	62915
invalid_ein_count	191
ein_validity_rate_pct	99.7
invalid_ein_examples	000000001, 000000001, 000000001, 001625898, 001625898, 001625898, 003360711, 003360711, 003360711, 003680161
empty_npi_groups	53
groups_without_tin	0
npis_in_multiple_groups	36714

## Code Coverage — Metrics

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unique_codes_total	26125
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<b>duplicate_codes</b>	0		
<b>duplicate_pct</b>	0.0		
<b>by_code_type</b>	HCPCS	7812	
	CPT	15112	
	CDT	939	
	MS-DRG	818	
	APC	877	
	RC	566	
	PROC	1	
<b>unknown_code_types</b>	PROC	1	
<b>format_invalid_by_type</b>	CPT	3924	
<b>codes_not_in_reference</b>	reference_not_loaded		
<b>most_frequent_codes</b>	<b>Type</b>	<b>Code</b>	<b>Occurrences</b>
	HCPCS	L5520	1
	CPT	0734T	1
	CPT	4BHM4	1
	CDT	D6985	1
	MS-DRG	476	1
	HCPCS	L3595	1
	HCPCS	Q5136	1
	HCPCS	L2010	1
	CPT	64722	1
	HCPCS	J3397	1
	APC	9183	1
	CPT	43262	1
	HCPCS	Q4016	1
	HCPCS	G0128	1
	CPT	45520	1
	HCPCS	G9476	1
	HCPCS	G9939	1
	HCPCS	Q4259	1
	HCPCS	B5000	1
	CPT	29131	1

## Pricing Sanity — Metrics

<b>total_prices_checked</b>	805736626
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<b>total_rates</b>	804464129																																			
<b>per_diem_rates</b>	19082																																			
<b>percentage_rates</b>	1253415																																			
<b>negative_rates</b>	0																																			
<b>zero_rates</b>	69066																																			
<b>extreme_high_rates</b>	15610403																																			
<b>extreme_low_rates</b>	0																																			
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<b>unique_rate_contexts</b>	101095																																			

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<b>rate_key_dimension_validity</b>	<b>invalid_negotiated_type</b>	0
	<b>invalid_negotiated_types_seen</b>	{}
	<b>invalid_setting</b>	0
	<b>invalid_settings_seen</b>	{}
	<b>invalid_severity_of_illness</b>	0
	<b>severity_on_non_apr_drg</b>	0
	<b>institutional_with_service_codes</b>	0
	<b>invalid_service_code_format</b>	0
	<b>billing_code_modifier_too_long</b>	0

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# Scoring Methodology

Embedded in this report at generation time.

## Overall Score

Weighted sum of four structural dimensions, normalized to a 0–100 scale.

Normalized Weights		
	Schema Integrity	30%
	Provider Mapping	15%
	Code Coverage	15%
	Pricing Sanity	40%

Confidence Bands		
	High	≥90
	Usable With Caution	≥75
	Limited Reliability	≥60
	Not Usable	<60

Score Caps		
	Raw Json Errors Only → 74.0	Native JSON syntax errors in the unpatched source file. File must be re-exported by the payer; scoring reflects auto-patched data only.
	Cms Validation Failure Only → 65.0	CMS official schema validator reports the file does not conform to the TIC spec.
	Both Raw Json Errors And Cms Failure → 59.0	Both native JSON syntax errors and CMS schema validation failure present.

## Rate Context Key — 14-Tuple Field Coverage

Every rate in a CMS TIC MRF file is described by a 14-field tuple. Fields 1–10 form the rate-context key used to group and compare rates across the system. Fields 11–12 (provider, expiration date) are validated separately and excluded from the grouping key for analytical reasons. Each of the four scoring dimensions validates a distinct slice of this tuple — together they cover all 14 fields.

Field	Validated by
1 billing_code_type	Schema (required field) + Code Coverage (enum + format validation)
2 billing_code_type_version	Schema (required field)
3 billing_code	Schema (required field) + Code Coverage (format, duplicates, reference lookup)
4 billing_code_modifier	Pricing (modifier length, key normalization)
5 service_code	Pricing (POS format, normalization, institutional-class check)
6 negotiated_type	Pricing (CMS TIC enum validation)
7 billing_class	Schema (CMS TIC enum validation) + Pricing (spread thresholds)
8 negotiation_arrangement	Schema (CMS TIC enum validation) + Pricing (FFS vs bundle/capitation gating)
9 severity_of_illness	Pricing (APR-DRG only, valid values 1–4)

Field	Validated by
10 setting	Pricing (CMS TIC enum validation)
11 provider (NPI/EIN)	Provider Mapping (Luhn checksum, IRS prefix, group resolution) — excluded from grouping key
12 expiration_date	Schema (date validity, far-future sanity) — excluded from grouping key
13 additional_generic_notes	not validated (free-text)
14 negotiated_rate	Pricing (negative/zero/extreme-value checks, spread analysis)

- Fields 1–10 are the grouping key. Each unique combination is a distinct rate context — rates with different modifiers, POS codes, or arrangements land in separate buckets and are never compared against each other.
- Provider (field 11) is excluded from the key: the spread check is cross-provider by design. Partitioning by provider produces singleton buckets and eliminates the spread signal.
- Expiration date (field 12) is excluded because it is a contract lifecycle attribute, not a clinical context. Rates for the same service should be comparable regardless of when they expire.
- service\_code (field 5) arrays are flattened and normalized before keying: '1' → '01', and a rate with ['11','22'] contributes to both the '11' and '22' buckets so rates are compared apples-to-apples by place of service.

## Schema Integrity

Validates required fields, enum values, conditional requirements, and date validity per the CMS TIC in-network-rates schema. Also checks file freshness and expiration date sanity.

**Method:** Penalty-based deductions from 100, capped per category.

per_missing_required_header_field	5
per_header_conditional_issue	2
freshness_warn	5
freshness_error	10
item_missing_fields_pct	×5 (cap 30)
empty_rates_pct	×0.5 (cap 5)
price_missing_fields_pct	×10 (cap 30)
rates_without_providers_rate	×200 (cap 20)
expired_prices_pct	×0.5 (cap 5)
file freshness warn days	45
file freshness error days	90
expiry far future years	3

## Provider Mapping

Verifies that all provider\_group\_id references in in\_network items resolve to an entry in the provider\_references array. Validates NPI integrity via Luhn checksum and EIN integrity via IRS-issued 2-digit prefix.

**Method:** Weighted component sum (not purely penalty-based).

<b>provider_resolution (60%)</b>	$\text{resolution\_rate\%} \times 0.60$
<b>npi_validity (30%)</b>	$(100 - \text{invalid\_npi\_pct} \times 5) \times 0.30$
<b>ein_validity (10%)</b>	$10 - (\text{invalid\_ein\_pct} \times 0.1)$ [0% invalid → 10 pts, 100% invalid → 0 pts, linear]

## Code Coverage

Tracks every (billing\_code\_type, billing\_code) pair and flags unrecognized CMS TIC code types, format violations for CPT/HCCPS/NDC, and duplicates (same code appearing in multiple in\_network items).

**Method:** Penalty-based deductions from 100.

<b>per_unknown_code_type</b>	3 pts each (cap 20)
<b>format_invalid_pct</b>	$\times 0.5$ (cap 10)
<b>duplicate_code_pct</b>	$\times 2$ (cap 20)
<b>codes_not_in_reference_pct</b>	$\times 0.5$ (cap 30) — only when reference set is loaded

## Pricing Sanity

Detects invalid rates (negative, zero, extreme-value) and distribution anomalies (per-class P95/P50 spread, per-code max/min ratio, flat-rate distributions). Exact counts are used for all validity checks (negative, zero, extreme, dimension validity). Percentile-based checks (spread, IQR) use reservoir sampling —  $k=5\,000$  global,  $k=1\,000$  per (billing\_class, negotiated\_type) bucket — so memory stays bounded on large files. Per-code max/min spread is exact (all rates seen, no sampling).

**Method:** Penalty-based deductions from 100.

<b>negative_rate_pct</b>	$\times 5$ (cap 20)
<b>zero_rate_pct</b>	$\times 3$ (cap 15)
<b>extreme_rate_pct</b>	$\times 5$ (cap 25) — ffs only
<b>class_spread_excess</b>	$(\text{spread} - \text{threshold}) \times 2$ , max across (billing_class, negotiated_type) buckets (cap 15)
<b>per_code_high_spread_count</b>	$\times 0.1$ (cap 15)
<b>invalid_negotiated_type_pct</b>	$\times 3$ (cap 10) — rates silently dropped
<b>invalid_setting_pct</b>	$\times 1$ (cap 5) — silently defaults to wildcard
<b>invalid_severity_pct</b>	$\times 1$ (cap 5) — silently normalised to ''
<b>institutional_with_service_codes_pct</b>	$\times 1$ (cap 5) — extra key variation
<b>invalid_service_code_pct</b>	$\times 2$ (cap 5) — encode raises ValueError
<b>extreme high by billing class</b>	professional: 25000.0, institutional: 2000000.0, both: 2000000.0, default: 500000.0

<b>extreme low</b>	0.01
<b>spread warn p95 over p50 by class</b>	professional: 5, institutional: 10, both: 10, default: 5
<b>per rate context max min ratio</b>	professional_codes: 20, facility_drg_codes: 50
<b>flat rate iqr p75 threshold pct</b>	5.0
<b>flat rate min rates to check</b>	100
<b>spread min n to flag</b>	50
<b>per code min n to flag</b>	3

## Dashboard: MRF Identity Key

(ingest-time — not stored in report JSON)

The dashboard assigns a persistent `mrf_key` to each MRF so that all validation runs of the same file are grouped together in the score-history view, even if the payer re-exports the file at a new URL.

<b>Tier 1 — entity + plan_id</b>	Used when both <code>reporting_entity_name</code> and <code>plan_id</code> are present. Key input: <code>plan &lt;entity&gt; &lt;plan_id_type&gt; &lt;plan_id&gt;</code> . Stable across monthly re-exports.
<b>Tier 2 — URL hash</b>	Fallback when <code>plan_id</code> is absent. Key input: the raw file location URL/path. Entity name alone is not used — a payer publishes multiple distinct plans under the same entity name and without <code>plan_id</code> they cannot be safely distinguished. A URL change produces a different key.

The key is a 16-character MD5 hex digest of the input string (case-insensitive, whitespace-stripped). **This run:** `mrf_key = df7f402c659fd156 · entity = Providence_Health_Plan · tier = 2 (URL hash)`

## Provider Geographic Coverage

(supplemental — does not affect score)

Geographic analysis is a supplemental feature computed on demand after scoring completes. It does not affect any scoring dimension — it is an observational overlay to assess the breadth and distribution of in-network providers.

<b>NPPES</b>	CMS National Plan and Provider Enumeration System — monthly full-replacement CSV. Maps each NPI to its primary registered ZIP code.
<b>ZCTA centroids</b>	GeoNames US postal code file. Maps each 5-digit ZIP to a (latitude, longitude) centroid for map placement.

**Process:** Extract all NPIs from the MRF file → resolve each NPI to its primary practice ZIP via NPPES → aggregate provider count per ZIP → map each ZIP to a lat/lon centroid via ZCTA → render as a weighted heatmap (intensity ∝ provider count per ZIP).

**Limitations:** NPIs absent from NPPES (recently issued, test NPIs, EINs) are excluded and reduce the geocoding match rate. Location reflects the provider's NPPES-registered primary address, not necessarily where they accept this specific plan. Map viewport covers the bounding box of ZIP codes representing 90% of total provider count, dropping sparse geographic outliers.