

MRF Quality Report

s3://talon-storage-private/mrf-feed-uploads/2026-03/2026-03-02_AllianceTrilogy_in-network_rates.json
Size: 521.80 MB • MD5: 886e3d685a9bbf3aaf685cc7fc7d6db6

Payer: **Trilogy Health Solutions** • File Date: **2026-03-02** • Generated: **2026-04-23 23:26 EDT** • Tool Version: **1.0.0** • Elapsed: **95.60s**

65.0

Limited Reliability

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

Errors: 2 • Warnings: 5 • Info: 4

TOC Plan References

TOC: s3://talon-storage-private/mrf-feed-uploads/2026-03/2026-03_plan_ref_6d4c20146456785061f8aadd1a445695_index.json • Talon

Canonical: s3://talon-storage-private/mrf-feed-uploads/2026-03/2026-03-02_AllianceTrilogy_in-network_rates.json

Plan Name	Plan ID	Issuer / Sponsor	Market
ALLIANCE - TRILOGY HEALTH SOLUTIONS	123456789 (custom)	—	—

CMS Official Schema Validation

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

Validator output (truncated at 200 lines):

```
warn Schema version v2.1.0 was provided, but file indicates it conforms to schema version 2.1.0. v2.1.0
will be used.
info Running validator container...
info Input JSON is invalid.
Invalid schema: #
Invalid keyword: errors
Invalid code: -1
Invalid message: One or more validation errors have occurred
Invalid document: #
Error report:
{
  "oneOf": [
    {
      "errors": [
        {
          "pattern": {
            "actual": "59",
            "errorCode": 8,
            "instanceRef": "#/in_network/401/negotiated_rates/0/negotiated_prices/0/
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            "schemaRef": "#/definitions/negotiated_price/properties/service_code/oneOf/0/items"
          }
        },
        {
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            "schemaRef": "#/definitions/negotiated_price/properties/service_code/oneOf/1/items"
          }
        }
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            "errorCode": 8,
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            "schemaRef": "#/definitions/negotiated_price/properties/service_code/oneOf/1/items"
          }
        }
      ]
    }
  ]
}
```

```

    }
  },
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      }
    }
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  "schemaRef": "#/definitions/negotiated_price/properties/service_code"
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        "schemaRef": "#/definitions/negotiated_price/properties/service_code/oneOf/1/items"
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},
{
  "errors": [
    {

```

```

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                "schemaRef": "#/definitions/negotiated_price/properties/service_code/oneOf/0/items"
            }
        },
        {
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```

```

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        "schemaRef": "#/definitions/negotiated_price/properties/service_code/oneOf/1/items"
    }
}
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"schemaRef": "#/definitions/negotiated_price/properties/service_code"
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    "schemaRef": "#/definitions/negotiated_price/properties/service_code"
},
{
    "errors": [
        {
            "pattern": {
                "actual": "59",

```

... (truncated)

Dimension Scores

Dimension	Score	Weight	Findings
Schema Integrity	70.0	30%	4
Provider Mapping	100.0	15%	1
Code Coverage	98.3	15%	1
Pricing Sanity	71.8	40%	5

Schema Integrity — Findings

Score: 70.0

WARNING `file_freshness`

File is 52 days old (last_updated_on exceeds the 45-day threshold)

WARNING `expired_prices`

27486 negotiated_prices have past expiration dates (2.5%)

INFO `far_future_expiration`

37326 expiration_dates are more than 3 years in the future

ERROR `cms_schema_validation`

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

Provider Mapping — Findings

Score: 100.0

INFO `duplicate_npis`

3363 NPIs appear in more than one provider group

Code Coverage — Findings

Score: 98.3

WARNING `billing_code_format`

515 CPT codes do not match expected format

Pricing Sanity — Findings

Score: 71.8

INFO `per_diem_rates`

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

INFO `percentage_rates`

826 percentage rates (0.1%) — values represent % of a reference rate, not dollar amounts; excluded from spread analysis

ERROR `zero_rates`

7010 zero-dollar rates (0.63%) — CMS schema requires `negotiated_rate > 0` (exclusiveMinimum)

WARNING `rate_spread_by_class`

`billing_class='professional' / negotiated_type='fee schedule':` P95/P50 spread is 10.5x (threshold: 5x, N=834,344 (1,000 sampled), high confidence)

WARNING `per_code_rate_spread`

23493 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
E0986	HCPCS	fee schedule	institutional	ffs	both	\$0.05	\$3826.78	\$4642.62	\$17286.01	345720.2*	17
E1010	HCPCS	fee schedule	institutional	ffs	both	\$0.02	\$1121.60	\$1415.69	\$5419.54	270977.0*	18
20697	CPT	fee schedule	institutional	ffs	both	\$1.41	\$2602.42	\$15301.32	\$178923.42	126896.0*	14
E1004	HCPCS	fee schedule	institutional	ffs	both	\$0.24	\$4869.04	\$5965.63	\$23070.66	96127.8*	19
91112	CPT	fee schedule	institutional	ffs	both	\$0.94	\$1787.47	\$9158.84	\$76941.47	81852.6*	10
E1230	HCPCS	fee schedule	institutional	ffs	both	\$0.12	\$1994.87	\$2310.06	\$8475.79	70631.6*	23
91111	CPT	fee schedule	institutional	ffs	both	\$0.47	\$1129.25	\$3469.79	\$28326.57	60269.3*	11
J9263	HCPCS	fee schedule	institutional	ffs	both	\$0.05	\$8.77	\$562.81	\$2868.87	57377.4*	9
E1700	HCPCS	fee schedule	institutional	ffs	both	\$0.02	\$230.60	\$279.77	\$1041.67	52083.5*	17
J8540	HCPCS	fee schedule	institutional	ffs	both	\$0.01	\$0.25	\$120.54	\$481.89	48189.0*	7

Recommended Actions

1. **schema** `cms_schema_validation`

P1

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

2. **pricing** zero_rates

P1

7010 zero-dollar rates (0.63%) — CMS schema requires negotiated_rate > 0 (exclusiveMinimum)

3. **pricing** rate_spread_by_class

P2

billing_class='professional' / negotiated_type='fee schedule': P95/P50 spread is 10.5x (threshold: 5x, N=834,344 (1,000 sampled), high confidence)

4. **pricing** per_code_rate_spread

P2

23493 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.

5. **schema** file_freshness

P2

File is 52 days old (last_updated_on exceeds the 45-day threshold)

6. **schema** expired_prices

P2

27486 negotiated_prices have past expiration dates (2.5%)

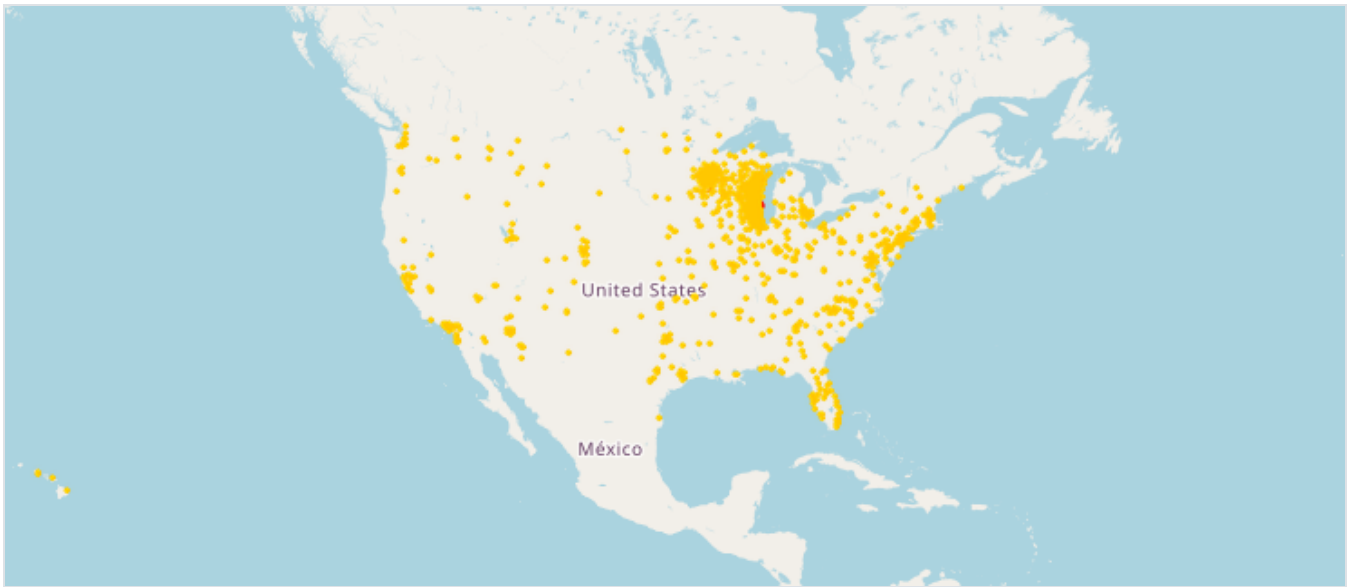
7. **code_coverage** billing_code_format

P3

515 CPT codes do not match expected format

Provider Geographic Coverage

17425 unique NPIs found — 17405 geocoded (100%) — 1375 zip codes represented.



Schema Integrity — Metrics

header_missing_fields		
header_conditional_issues		
file_age_days		52
items_total		14745
items_missing_required_pct		0.0
items_empty_rates		0
prices_total		1113232
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	14745
billing_code_types	CPT	9771
	CSTM-ALL	1
	HCPCS	4115
	MS-DRG	736
	RC	122

expired_prices	27486
invalid_expiration_format	0

Provider Mapping — Metrics

provider_references_in_file	369
provider_group_ids_referenced	369
unresolved_references	0
resolution_rate_pct	100.0
npis_validated	21652
invalid_npi_count	0
invalid_npi_examples	
eins_validated	1179
invalid_ein_count	0
invalid_ein_examples	
empty_npi_groups	0
groups_without_tin	0
npis_in_multiple_groups	3363

Code Coverage — Metrics

unique_codes_total	14745	
duplicate_codes	0	
duplicate_pct	0.0	
by_code_type	CPT	9771
	CSTM-ALL	1
	HCPCS	4115
	MS-DRG	736
	RC	122
unknown_code_types		
format_invalid_by_type	CPT	515
codes_not_in_reference	reference_not_loaded	

most_frequent_codes	Type	Code	Occurrences
	CPT	0001A	1
	CPT	0001U	1
	CPT	0002A	1
	CPT	0002M	1
	CPT	0002U	1
	CPT	0003M	1
	CPT	0003U	1
	CPT	0004M	1
	CPT	0005U	1
	CPT	0006M	1
	CPT	0007M	1
	CPT	0007U	1
	CPT	0008U	1
	CPT	0009U	1
	CPT	0010U	1
	CPT	0011A	1
	CPT	0011M	1
	CPT	0011U	1
	CPT	0012A	1
	CPT	0012M	1

Pricing Sanity — Metrics

total_prices_checked	1113232
total_rates	1112230
per_diem_rates	176
percentage_rates	826
negative_rates	0
zero_rates	7010
extreme_high_rates	648
extreme_low_rates	0

rate_distribution	sample_n	1112230
	sample_k	5000
	confidence	high
	p5	7.9995
	p25	78.755
	p50	393.48
	p75	1441.79
	p95	4693.933500000001
	p99	9794.6874

by_billing_class	Class / Type	Count	Median	p25	p75	p95	Confidence
	institutional/ fee schedule	277,886	406.5	65.0	1149.5	3671.7	high
	professional/ fee schedule	834,344	438.5	84.5	1697.7	4611.1	high

negotiated_types	fee schedule	1112230
-------------------------	--------------	---------

unique_rate_contexts	784831
-----------------------------	--------

rate_key_dimension_validity	invalid_negotiated_type	0
	invalid_negotiated_types_seen	{}
	invalid_setting	0
	invalid_settings_seen	{}
	invalid_severity_of_illness	0
	severity_on_non_apr_drg	0
	institutional_with_service_codes	0
	invalid_service_code_format	0
	billing_code_modifier_too_long	0

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).

provider_resolution (60%)	$\text{resolution_rate\%} \times 0.60$
npi_validity (30%)	$(100 - \text{invalid_npi_pct} \times 5) \times 0.30$
ein_validity (10%)	$10 - \min(\text{invalid_ein_count} \times 0.2, 10)$

Code Coverage

Tracks every (billing_code_type, billing_code) pair and flags unrecognized CMS TIC code types, format violations for CPT/HCP/CS/NDC, and duplicates (same code appearing in multiple in_network items).

Method: Penalty-based deductions from 100.

per_unknown_code_type	3 pts each (cap 20)
format_invalid_pct	$\times 0.5$ (cap 10)
duplicate_code_pct	$\times 2$ (cap 20)
codes_not_in_reference_pct	$\times 0.5$ (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.

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

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

Tier 1 — entity + plan_id	Used when both <code>reporting_entity_name</code> and <code>plan_id</code> are present. Key input: <code>plan <entity> <plan_id_type> <plan_id></code> . Stable across monthly re-exports.
Tier 2 — URL hash	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 = 755439f09ba332b5 · entity = Trilogy Health Solutions · 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.

NPPES	CMS National Plan and Provider Enumeration System — monthly full-replacement CSV. Maps each NPI to its primary registered ZIP code.
ZCTA centroids	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.